

THE TRELLEBORG-TYPE FORTRESSES

[Illustration:
Tegning af de tre ringborge]

A comparative analysis of the Danish Viking Age ring fortresses

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THE TRELLEBORG-TYPE FORTRESSES

A comparative analysis of the Danish Viking Age ring fortresses

The ring fortresses represent some of the most remarkable monuments from the Viking Age. With their monumental character and uniform geometric construction these building works reflect a highly developed technical expertise and organisational manifestation.

1. Introduction

Four ring fortresses have been found in Denmark: Trelleborg near Slagelse, Fyrkat near Hobro, Aggersborg near Løgstør and Nonnebakken in Odense. Only the first three are preserved and stand today as visible ancient monuments (figure 1.1). The ring fortresses date from the Late Viking Age and are also referred to as *Trelleborg-type fortresses* after the first ring fortress to be excavated at Trelleborg. They probably represent Denmark's first truly royal fortresses.

The Trelleborg-type fortresses are characterised by a circular rampart with associated ditch and four covered gateways. All four fortresses have a uniform and strictly symmetrical ground plan which clearly sees expression in their circular form and the location of gateways corresponding approximately to the points of the compass. This applies in all cases, regardless of the terrain (figure 1.2.).

In the inner fortress area quadratic blocks of buildings were laid out, each comprising four c. 30 m long and up to 8 m wide long-houses of Trelleborg type, arranged in four-winged complexes. Between these blocks was a stringently laid out system of streets which divided the fortress up into quadrants. A circular road ran along the inside of the rampart and outside the rampart was a ditch.

Even though the Trelleborg-type fortresses appear generally uniform in configuration, they vary both with respect to size and constructional details. With its internal diameter of 240 m, Aggersborg is the largest of the four and is also Scandinavia's largest Viking Age fortress. In all, 12 blocks were laid out, containing a total of 48 long-houses. The internal diameter of Trelleborg is 136 m, whereas Fyrkat and Nonnebakken both had an internal diameter of 120 m. Within these three, there were 16 long-houses, arranged in four blocks. Trelleborg also had a ward and a further 15 long-houses located in an arc between the rampart of the ward and the circular rampart. At both Trelleborg and Fyrkat a cemetery was found outside the circular rampart. The cemetery at Trelleborg is located immediately inside the ward and it had 135 graves containing the remains of at least 157 individuals. At Fyrkat, a road or bridge linked the fortress with the cemetery. The cemetery has no marked boundary, but so far around 30 graves have been found and excavated (e.g. Nørlund 1948; Schultz 1949; Olsen & Schmidt 1977; Roesdahl 1977).

On the basis of radiocarbon and dendrochronological dates it has been established that the Trelleborg-type fortresses were built around AD 980 (Bonde & Christensen 1982:128ff; H. Andersen 1984:15). The Viking Age was characterised by great changes in Danish society and that of the Scandinavia as a whole: It was a time of colonisation, conquest and plunder, but also saw the founding of towns with associated trade and communication. The Christian Church ousted the ancient pagan beliefs, and the many petty kingdoms were joined to form three large realms – Sweden, Norway and Denmark. This centralisation of power brought about great changes in society and a completely new social structure. Denmark also became more closely linked to Europe. The Trelleborg-type fortresses probably did not have a particularly long lifetime, perhaps only 10-20 years. Fyrkat was, for example, destroyed by a fierce fire and never subsequently re-built.

Construction of the fortresses required great resources, both in terms of building materials and labour. The former comprised oak timber, grass turves, stone and earth. It is therefore obvious that there must have been a well-developed political power structure behind their construction; these building works must have been on the instigation of a king. With a construction date of around AD 980, the Trelleborg-type fortresses were built during the reign of King Harald Bluetooth (reigned from AD 958 until his death in c. AD 987), and they are traditionally linked with his efforts to unite the Danish and Norwegian realms and convert them to Christianity, according to the inscription in runes on the largest of the Jelling stones. Another interpretation links the fortresses with the conquest of England and, consequently, King Harald Bluetooth's son, Svein Forkbeard (born c. AD 960, died AD 1014). Whatever the case, the royal fortresses played a significant role in the unification of the realm. They reflect the magnitude of the political and military power plays of the time and should be seen as a monumental and military manifestation of the central power of the Late Viking Age.

2. Research, interpretation and presentation of the Trelleborg-type fortresses

2.1. Investigations of the property

Trelleborg near Slagelse was the first ring fortress to be excavated, between 1934 and 1942. Subsequently, the three other fortresses were discovered and more extensive excavations continued up until the middle of the 1960s. Following completion of these major archaeological investigations, apart from minor evaluations, no further archaeological excavations have been carried out on the actual ring fortresses.

Since 2007, in connection with the project 'The King's Fortresses', attention has been focussed on excavations in the wetland areas close to the fortresses. The aim of these has been to investigate possible relations between the fortresses and the military naval power of the time.

2.2. Publications

The results of the archaeological excavations are documented and published in several monographs of a high professional standard. Furthermore, popular books, booklets, brochures, leaflets and other presentation materials have also been produced for some of the sites. Both large- and small-scale exhibitions have similarly been mounted.

In connection with the application for inclusion of the Trelleborg-type fortresses on UNESCO's World Heritage List there are plans for a joint presentation project between museums, focussing on the development of new presentation and marketing opportunities for the ring fortresses.

2.3. Marking of the Trelleborg-type fortresses in the landscape

Following conclusion of the excavations at Trelleborg and Fyrkat the ramparts and ditches were marked and rebuilt or re-cut, respectively (figure 2.1 and 2.2). Postholes and other features of the fortresses' long-houses were also marked on the basis of the findings of the archaeological excavations at Trelleborg and Fyrkat (figure 2.3 and 2.4).

In 1992, work began on the raising of an earthen bank at Aggersborg intended to mark the original position and extent of the original circular rampart. The bank and associated ditch were completed that same year (figure 2.5).

2.4. Reconstructions of Viking Age long-houses

Outside the fortresses at Trelleborg and Fyrkat reconstructions have been built of long-houses of Trelleborg type. The long-house at Trelleborg was built in 1941. However, in the light of subsequent research this reconstruction is no longer considered to be correct. A cluster of small, reconstructed Viking Age buildings (Slagløse), including various pit-houses (*Grubenhäuser*) and a Haithabu house, was constructed NE of the ring fortress. Slagløse provides the setting for the museum's re-enactment-based interpretation and presentation, hands-on activities and craft demonstrations.

At Fyrkat, a long-house was constructed in 1984-85 which, on the basis of the most recent research results, represents a more correct reconstruction, including external bracers (i.e. support posts) and a hipped roof. About 1 km from Fyrkat (Fyrkat Viking Centre), a Viking Age farmstead from the time of the fortress was reconstructed between 1992 and 2002. This is used in the presentation of information about both the farm and the ring fortress. There are no plans to build reconstructions of Viking Age buildings at Aggersborg.

2.5. Museum facilities

All three preserved ring fortresses form a part of re-creative areas within their respective regions, and there are various signs and a range of written information to guide the public. There is good access, parking and toilet facilities at all three fortresses, but the standard of these varies from site to site.

2.5.1. Aggersborg

At Aggersborg, a small museum has been built housing a poster exhibition about the fortress, its use and its time. The exhibition is in English, German and Danish and is open all year round. For its first decade, the average annual recorded number of visitors to the fortress area is around 23,000. The actual number of visitors is estimated to be greater as some make use of another entrance at the southern end of the site which does not have a counter. Consequently, 30,000 visitors are expected to visit the site annually.

Aggersborg is owned by the Danish Nature Agency which, together with the municipality and the museum, is responsible for the necessary care and maintenance of the monument and the adjoining areas. Since 2002 hay has been cut twice yearly on the flat areas.

2.5.2. Fyrkat

Fyrkat is owned by the Danish National Museum, but it is Mariagerfjord Municipality which, jointly with the museum, is responsible for the necessary care and maintenance of the monument and the other areas. The fortress is open all year round. A Viking Age farmstead from the time of the fortress has been reconstructed (Fyrkat Viking Centre) about 1 km from Fyrkat. It is used as a base for the interpretation and presentation of the ring fortress and the farm itself.

During the season, Fyrkat Viking Centre has around 20,000 visitors. The museum and the municipality have plans for a new museum building of c. 1000 m² in conjunction with Fyrkat Viking Centre. The exhibitions here will deal with Fyrkat and life and events of the time.

2.5.3. Trelleborg

A museum was built at Trelleborg in 1995. This is located c. 300 m to the east of the 6 ha scheduled area around the ring fortress, on 7.1 ha of land owned by Slagelse Municipality. The scheduled area within and around the ring fortress is owned by the Danish National Museum.

The museum building contains exhibition areas, offices, reception with ticket sales and shop, café, toilets (including a disabled toilet) etc. The exhibition interprets and presents the history of Trelleborg, the finds from the fortress and the life and events of the time – the Viking Age – in Danish and English. In addition to posters and models, the original finds from the excavations in the 1930s and 1940s are displayed.

The museum building is open to the public during the season which runs from 1st April to 30th October. An older outdoor poster display about the Viking Age and the fortress is located in the vicinity of the reconstructed long-house. There is also an early model of the entire area around the ring fortress as well as outdoor disabled toilets. The ring fortress at Trelleborg, together with the other outdoor facilities, is open all year round. Visitor numbers for Trelleborg vary from year to year, but in recent times there have been about 30,000 visitors annually. As there is free access to Trelleborg out of season and outside normal opening hours, a considerably larger total number of visitors should be assumed.

Trelleborg Viking Fortress, under the Museum of Southwest Zealand, is responsible for the maintenance and care of the whole area. Maintenance mostly consists of cutting the grass on the ramparts using a special machine and ordinary grazing by sheep. The museum and the municipality have plans to develop and expand the museum at Trelleborg and the reconstructed hamlet of Slagløse in a new project: 'New Trelleborg'. The intention is to establish a new International Adventure and Knowledge Centre which can form the basis for research, interpretation, presentation and education of a high standard and which will ensure fruitful co-operation between these activities.

3. The topographic location of the Trelleborg-type fortresses

3.1. Aggersborg

Aggersborg is the northernmost of the Trelleborg-type fortresses and is located on a markedly sloping moraine feature, flanked to the east by low-lying wetlands and fields (figure 3.1). A large farm, Aggersborggård, is located on the southern part of the fortress. The fortress lies rather more than 2 km west of the narrowing of the Limfjord at Aggersund. This meant that in the Viking Age Aggersborg stood slightly off the beaten track and major road traffic and was, as a consequence, well protected from sudden attacks from the coast. The fortress also had a good strategic location with an unusually good view out over the water routes. Aggersborg's position suggests that the fortress must have been directed towards one of Denmark's most important navigation routes – the link for seagoing traffic between Western Denmark, Western Europe and the North Atlantic on the one side and Eastern Denmark and the Baltic area on the other.

3.2. Fyrkat

Fyrkat is located close to both *Hærvejen* (the Military Road) and Mariager Fjord (figure 3.2). In the Viking Age, a time when the water level was higher than it is today, Fyrkat was constructed at the head of Mariager Fjord, at the point where the fjord meets the river Onsild Å. Here, the fortress stood well protected on a promontory with open water to the north and bordered by Onsild Å. To the east and south were boggy meadows. Water by the fortress was probably between 0.5 and 1 m deep. Today the area has been re-established as a wetland area – boggy inaccessible terrain – demonstrating how good and secure a position Harald Bluetooth chose for his fortress.

3.3. Trelleborg

Trelleborg lies about 3 km from the Great Belt, in a cultivated, flat coastal landscape virtually lacking in woodland. It stands on a promontory where the large watercourses Tude Å and Vårby Å meet and encircle the site (figure 3.3). Consequently, the fortress occupies a good strategic position and is protected on all sides by, respectively, the two rivers and the ward which runs between them and screens the fortress from dry land. There is access to the promontory from the east and SE. In Viking times, the landscape was characterised by extensive wetland areas with bogs, meadows and commons. The ring fortress now constitutes part of a re-creative area around the rivers Tude Å and Vårby Å.

4. History and development

4.1. Aggersborg

The ring fortress is located on a scheduled area of 9.8 ha with a marked circular bank, which occupies the position of the original rampart, close to the Limfjord. As early as 1638, Aggersborg is mentioned in the so-called *Præsteindberetninger* (clerical reports) to the antiquarian Ole Worm – the first systematic gathering of information about ancient monuments in Denmark. The National Museum carried out a survey and a description of the fortress in 1906: At that time only three quarters of the circle was visible. The first actual excavations were conducted by C.G. Schultz between 1945 and 1952 (Schultz 1949). A smaller targeted excavation campaign was carried out by Mogens Brahe in 1954, and further excavations of the fortress were conducted by Olaf Olsen in 1970.

About half of the fortress has been investigated, and Else Roesdahl has analysed and published the majority of the evidence and finds from the site. The investigations revealed that the ring fortress corresponded to those at Trelleborg and Fyrkat but was much larger (Roesdahl 1984; 1986). Evidence of an earlier settlement from the 8th century was also located beneath the fortress. Towards the end of the 10th century this settlement was demolished to make way for the fortress. In 1987, the Ministry of the Environment/Forest and Nature Agency initiated a scheduling process for Aggersborg in order to protect the last traces of the rampart structure from total obliteration. Until then, the area had been subject to intensive cultivation. In 1990, the Danish National Museum carried out targeted excavations of parts of the rampart with the ultimate aim of marking the structure (Ulriksen 1990). The scheduling was also completed that same year and had the intention of preserving and protecting the area's cultural-historical and archaeological assets, including safeguarding the Viking fortress of Aggersborg. The scheduling ensures public access to a small museum building and to the marked rampart, which was completed in 1994.

4.2. Fyrkat

Fyrkat was surveyed and described for the first time by Daniel Bruun in connection with the National Museum's systematic surveys of the hundreds (i.e. districts) in 1894. The first excavations probably took place in 1943 without, however, actual building remains being discovered. More extensive excavations were conducted at Fyrkat between 1950 and 1963. Early in the course of these C.G. Schultz was able to establish that Fyrkat is one of the Trelleborg-type fortresses and that it is also closely related to Aggersborg. Minor excavations were carried out at Fyrkat in 1973. Of the fortress' four quadrants, only three have been excavated. The finds are exhibited at Hobro Museum and at the National Museum in Copenhagen. The results of the Fyrkat excavations are dealt with in most detail by Olaf Olsen, Holger Schmidt and Else Roesdahl (Olsen & Schmidt 1977; Roesdahl 1977).

In 1964, Fyrkat was scheduled, together with its immediate surroundings of 60 ha. Three years later, in 1967, a further 76 ha were scheduled resulting in a total protected area now of 136 ha. Most of the scheduled area is in private ownership and the protection constitutes primarily landscape scheduling which has the intention of protecting landscape assets. Since the end of the 1990s, parts of the river valley have stood under water during the winter because drainage pumps were turned off during this period. In 2008, this resulted in the initiation of a nature rehabilitation project with the creation of a lake in a small part of the river valley. This has had, and will continue to have, great significance for nature assets.

4.3. Trelleborg

The first time Trelleborg was recognised as an ancient monument was in 1808. However, from the 17th century onwards, several cartographers had included the ring fortress on various maps, including one from 1768. The ramparts at Trelleborg were, however, first scheduled in 1873. Despite this, the area, including the ramparts, was still subjected to destructive ploughing and damage until 1933, when the local motorcycle club had plans to build a race track within the monument. The National Museum excavated the fortress area, large parts of the ramparts, the ditches and the ward between 1934 and 1942 under the direction of Poul Nørlund (Nørlund 1948; Petersen & Woller 1989; Andersen 1996). As this was the first of the ring fortresses to be recognised, it has given its name to the monument type. In addition to evidence of the actual fortress and the settlement, there were also Neolithic remains in the form of refuse pits and possibly parts of a causewayed enclosure of Sarup type (Neolithic, c. 3000 BC) as well as pits dating from the Early Iron Age.

On conclusion of the excavation at Trelleborg, the ramparts and ditches were marked and re-cut and the various features marked out in concrete. This is how Trelleborg appears today. The eastern entrance to the actual scheduled fortress area has, however, been moved northwards in recent times to the area around the river Tude Å. The scheduled area covers c. 6 ha. The finds from the excavations are either on display in the Museum at Trelleborg or at the National Museum in Copenhagen.

4.4 The project 'The King's Fortresses'

Between 2007 and 2009, in connection with the project 'The King's Fortresses', small excavations in the form of trial trenches were conducted at all three fortresses. The aim of these was to map possible links between the Trelleborg-type fortresses and the maritime environment and military naval power of the time. The excavations resulted in many new results relevant to an understanding of the earliest royal fortresses of the Viking Age (Dobat 2009; 2010; Dobat et al. 2009).

The investigations at Aggersborg revealed very modest traces of features and finds from the Viking Age – only a sherd of a semi-circular vessel and a bone skate. Metal-detector surveys in the area have, however, resulted in the location of weights, fibulas/brooches, fittings, buckles etc. Aggersborg's location links the ring fortress directly to the maritime environment, but the excavations did not uncover any finds suggestive of sea-faring/navigation or any form of shipyard function. The excavations did, however, uncover astonishing traces of a new, previously undiscovered and presumed medieval structure. This has not as yet been examined in sufficient detail to permit comments to be made on the nature of the fortress and its buildings. The project leader, A.S. Dobat, compares the structure with the Halkær fortress and believes that it represents the medieval royal residence at Aggersborg, mentioned in several documentary sources, including a letter from 1373. According to this letter, it appears that local magnate Niels Eriksen Gyldenstjerne, who destroyed the royal residence at Aggersborg in connection with a rebellion against Valdemar

IV, intended to rebuild at the site (Roesdahl 1986:98). Whether these new discoveries represent the same royal residence it is not possible to ascertain at present.

At Fyrkat, in addition to a modest finds assemblage comprising various wooden objects, rivets, a range of metal finds (including a knife blade and a weight), whetstones, quernstones of mica schist etc., a long canal-like structure of complex construction was discovered. Of the many possible functions suggested for this structure, a source of fresh water fits well with the lack of wells seen at the site. The water level in Mariager Fjord was at least 0.5 m higher during the Viking Age than it is now and Dobat is of the opinion that Fyrkat was incorporated within a maritime environment. He believes that navigation conditions at Fyrkat suggest that it was possible to sail up to the fortress in Viking ships, the construction of which allows them to navigate in relatively shallow waters. Even so, there are no finds to confirm that ships did sail to Fyrkat or that any form of shipyard activity had taken place there.

The excavations at Trelleborg revealed a previously unknown part of a ditch located to the west of the circular rampart and occupying a position where a possible western continuation of the already located ditch would be expected. The finds included various iron objects, pottery, weights, glass beads, whetstones and rivets. Due to the good conditions for preservation, large quantities of wooden finds, animal bones and textile remains were preserved. The wooden finds include wood chips and other wood waste, fragmented artefacts, half-finished components for comb-making and a painted, circular shield. It is Denmark's only example of a shield from the Viking Age and is of the same time as those found in the ship burial at Gokstad in Norway. The shield originated from Western Norway and can, on the basis of dendrochronological analyses, be dated to the mid/late 10th century.

Dobat believes that Trelleborg was incorporated into a maritime environment and that it was possible to sail up to the fortress at the confluence of the two rivers, Tude Å and Vårby Å. He also believes that this potential was exploited. Structures and finds do appear to suggest that repairs to ships and ship-building did take place to a limited extent, but that Trelleborg did not have any particular role relative to ship building and navigation in the Viking Age (Dobat et al. 2011).

The investigations carried out during the course of the project 'The King's Fortresses' have added new information to the already existing picture of the ring fortresses of Aggersborg, Fyrkat and Trelleborg. The project's primary aim, to investigate the question of whether, and, if so, to what degree, the Trelleborg-type fortresses were linked to ships and navigation, remains however unresolved. No traces have been found either of actual shipyards or areas where extensive repairs to ships were carried out. Only at Trelleborg were traces of activities found which are related to work on ships. If Trelleborg had a special function in relation to ships, navigation and maritime warfare, this has not left any evidence in the form of large quantities of waste products from ship-building or repairs. These functions could have taken place elsewhere. In some cases, "*Snekke*" place names suggest the former location of activities involving ships.

5. The Trelleborg-type fortresses on UNESCO's World Heritage Sites' Tentative List

In January 2009, the Trelleborg-type fortresses of Aggersborg, Fyrkat and Trelleborg were all included on UNESCO's Tentative List of World Heritage Sites. This means that the fortresses are considered to be of international significance and inalienable for World Heritage. A proposal is made for inclusion of the Trelleborg-type fortresses on the World Heritage List in a serial

nomination, together with seven other Viking Age localities from six Scandinavian and European countries. All eight of these localities are considered to be of outstanding universal value (OUV) at the same time as collectively representing the Viking Age diversity in this early maritime culture.

6. Grounds for inclusion on UNESCO's World Heritage List

6.1. Criteria for inclusion of the property and the reasons for these

A number of criteria, determined by the UNESCO Committee, must be satisfied in order for incorporation on UNESCO's World Heritage List to proceed. The Trelleborg-type fortresses form part of a serial nomination but satisfy in themselves a minimum of two of the criteria. Satisfaction of one or more of the criteria confers on the property (the Trelleborg-type fortresses) the status of being of outstanding universal value. If a property can be characterised as being of outstanding universal value, it can be incorporated onto the World Heritage List.

The Trelleborg-type fortresses satisfy both criterion (iii) and criterion (iv):

(iii) The property should bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared:

The ring fortresses are exceptional evidence of the Viking Age's monumental and defensive constructions. There are no contemporaneous parallels either in the Nordic Countries or Europe.

(iv) The property should be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history:

The Trelleborg-type fortresses Aggersborg, Fyrkat and Trelleborg are with their stringent geometrical and symmetrical construction the most monumental manifestation of the central power's capacity in the Late Viking Age. Through their position in the landscape they demonstrate with great clarity a strategic intention.

The fortresses should probably be seen in the context of the "unification of the realm" as referred to on the largest of the two rune stones in Jelling. Consequently, they represent an important element in the protracted process which led to integration of the Nordic Countries into the European cultural community and the formation of the Scandinavian states. In the light of their date of construction, around AD 980, they should be perceived in relation to the expansion and strengthening at the same time of Danevirke which is included as one part of the transnational application for serial nomination in *Viking Monuments and Sites* to UNESCO's World Heritage List.

6.2. The Trelleborg-type fortresses seek inclusion on the World Heritage List in a serial nomination

Denmark hereby applies for the inclusion of the Trelleborg-type fortresses on the World Heritage List in a serial nomination with seven other transnational properties (the Trelleborg-type fortresses, the Jelling complex, the Vestfold burial mounds, the Hyllested quarry, Birka and Hovgården, Pingvellir, Grobiņa, Haithabu and Danevirke) from six countries (Denmark, Norway, Sweden, Iceland, Latvia and Germany). The properties are sought included under criterion (iii). Three of the properties – Jelling, Birka and Pingvellir – are already included on the World Heritage List. The Trelleborg-type fortresses, which are included on the Tentative List on the basis of criterion (iv), satisfy both criteria (cf. Section 3b).

7. Comparative analysis of the Trelleborg-type fortresses

7.1. Ring fortresses of Trelleborg type

The Danish ring fortresses of Aggersborg, Fyrkat og Trelleborg, are of outstanding universal significance and represent the most prominent archaeological evidence for the Viking Age's monumental and defensive construction works. No similar structures of the same age exist in either the Nordic Countries or in Europe, and through their position in the landscape they clearly demonstrate a strategic intent.

The fortresses should probably be perceived in the context of the 'unification of the realm' which is referred to on the great Jelling stone and must therefore be considered as an important element in the protracted process which led to the integration of the Nordic Countries in the European cultural community and the formation of the Scandinavian states. Furthermore, with a construction date of around AD 980 the fortresses should be seen in relation to the contemporaneous expansion and strengthening of Danevirke which forms part of the transnational application for nomination to UNESCO's World Heritage List.

As there are no similar structures of the same type, it is unlikely to prove possible to determine securely the source of inspiration for their construction. The circular fortress type probably developed in Denmark, inspired by a number of slightly earlier ring fortresses in the Slavic area or along the coast of Flanders or Northern France. Two ring fortresses in Scania – Trelleborg and Borgeby (and perhaps also a third, Foteviken) – are related to the Danish ring fortresses but do not belong to the same type.

The Trelleborg-type fortresses cannot be viewed in isolation. They must be put into an historical context involving Harald Bluetooth's unification of the realm and also including the burial monuments and associated palisade area at Jelling and the defensive structure Kovirke at Danevirke. Harald Bluetooth, who is traditionally seen as being responsible for the construction of the Trelleborg-type fortresses, buried his parents at Jelling, where he raised rune stones in their honour. He also erected a rune stone in honour of his own achievements in unifying the realm and in the conversion of the population to Christianity.

The strengthening of the country's defences and the unification of the realm are represented by the construction of great monumental building works. Further to the burial mounds at Jelling, with associated palisade area, these also include the Trelleborg-type fortress, the defensive structure of Kovirke at Danevirke, the bridge at Ravning Enge and the fortification of a number of at the time Danish towns, including Haithabu, Ribe and Aarhus. These building works are also ascribed important significance in the subsequent retention of power. On the basis of Kovirke's dead straight course and radiocarbon dates for the structure of c. AD 980, this defensive structure is seen as having been constructed at the same time, and possibly by the same builder, as the Trelleborg-type fortresses.

7.1.1. Aggersborg

7.1.1.1. The fortress

Before the ring fortress was constructed at Aggersborg, a settlement was built on part of the area some time during the 8th century AD (Schultz 1949; Roesdahl 1986). Towards the end of the 10th century this settlement was abolished in order to make way for the fortress. The settlement has not

been uncovered in its entirety, but it appears to have been unfortified. More than 100 pit-houses/*Grubenhäuser* and eight east-west-oriented long-houses have been investigated. These buildings had curved longitudinal walls and were between 13 and 41 m long. They differ from the buildings within the fortress in their wall construction and support of the roof – for example they did not have the sloping bracers, i.e. support posts. Also in contrast to the fortress buildings they showed evidence of having been repaired numerous times. The settlement is of the same general character as a large number of other villages from the period.

The finds assemblage reveals that some prosperity was to be found at the site prior to the construction of the fortress. The finds include a large gold arm ring, coins and large numbers of local and imported artefacts. A silver coin (one of two) suggests a date for the construction of the fortress.

In many places it was impossible to separate the features and finds belonging to the ring fortress from those of the earlier settlement. Despite the fact that Aggersborg has not yet been fully excavated, it has proved possible to determine the internal diameter of the circular rampart as c. 240 m. The rampart was 11 m wide and clad with timber, both externally and internally, and the horizontal planks were secured on the outside with cross braces. There was a c. 8 m wide berm between the rampart and the 5 m wide and 1.3 m deep V-shaped ditch.

Within the rampart, the structure was divided into four quadrants by two wood-paved axis streets which cross at the centre. Each quadrant is further divided up by short transverse streets into three smaller blocks of buildings arranged around the yards (figure 7.1 and 7.2).

7.1.1.2. The buildings

In each quadrant there were 12 long-houses, arranged in three blocks, i.e. the, in all, 48 buildings were arranged to form 12 blocks each of four long-houses. The buildings have curved longitudinal walls and measure c. 32 m in length and have a maximum width at the middle of c. 8 m. They were divided up internally into three rooms, with a 19.5 m long hall in the middle, often with a central hearth. At each end of the long-house there was a smaller gable room. The long-houses are of the same type as seen in the blocks at Trelleborg and Fyrkat. The wall construction was probably the same as at Fyrkat – double earth-set wall posts with vertical stave planks filling out the spaces as was also the case at Trelleborg. The buildings had sloping external bracers, i.e. support posts (Olsen & Schmidt 1977; Roesdahl 1977; Schmidt 1981; 1985).

7.1.1.3. Dating

The fortress cannot be dated more exactly on the basis of the finds than to the time around AD 1000. The similarities to Fyrkat and Trelleborg mean, however, that a construction date of around AD 980 has been arrived at. The lifetime of the fortress was very short, if it was at all completed before it became superfluous.

Aggersborg is the only one of the three ring fortresses to be mentioned in written sources, but whether this reference is to the actual excavated fortress is uncertain. In St Knud's Monastery, Odense, the English monk Aelnoth wrote an account of the revolt against Canute the Holy, which erupted while the king was residing by the Limfjord. His men were sent to Aggersborg while he fled to the episcopal residence in Bejstrup, 8 km to the NE. The king was subsequently killed in Odense in 1086.

7.1.2. Fyrkat

7.1.2.1. The fortress

The structure comprised a circular rampart with an inner diameter of 120 m. The fortress was enclosed within a 12 m wide rampart, the outer face of which was formed by a wooden palisade. At a distance of c. 10 m from the rampart lay a ditch, which was V-shaped, 8 m wide and a couple of metres deep. At the four points of the compass the rampart was interrupted by gateways which were built over with a wooden construction. Two wood-paved main streets link the gateways, crossing each other at the centre of the fortress, thereby dividing the structure into quadrants. In addition to these main axes there was a wood-paved road running around the inner side of the rampart (figure 7.3 and 7.4).

7.1.2.2 The buildings

Within the circular rampart were 16 long-houses arranged to form four blocks; one block in each quadrant. Each block comprised four identical wooden long-houses arranged as wings around a quadratic yard. Only three of the four blocks have been excavated. The length of the houses at Fyrkat was c. 28.5 m and their width was 7.3 m in the middle and c. 5 m at the straight gables. During the excavations at Fyrkat it was documented for the first time that the houses had sloping support posts. The wall construction consisted of double earth-set wall posts, with vertical stave planks filling out the walls; there were also vertical stave planks at Trelleborg but without the double wall-post construction (Olsen & Schmidt 1977; Roesdahl 1977; Schmidt 1981; 1985).

The buildings were divided up into three rooms with a c. 18 m long hall in the middle. At each gable end there was a smaller room. In a number of the houses the presence of a stone-set hearth could be demonstrated in the middle room. Like the houses at Trelleborg, those at Fyrkat had four doors. A special feature of the houses at Fyrkat (and Trelleborg) was, however, that the side doors were fitted with porches. The porches which faced the street were shorter than those facing out towards the rampart and the yard.

On the yards of the three excavated quadrants remains were found of a small quadrangular building with a hearth. Further to these there was a small house at both the east and west gateway. Not all the long-houses had been used as living quarters. It was possible to identify buildings which had been used for metal-working and as stores.

7.1.2.3. The cemetery

A cemetery is located NE of the ring fortress and around 30 inhumation graves of men, women and children have been excavated here. The richest of the graves was that of a woman who was buried in a body of a carriage. This grave stood out from the rest. In the grave – together with the woman's remains – were a number of imported eastern ornaments, including a silver pendant, a bronze bowl and a box brooch, together with two toe rings and unusual contents such as owl pellets and seeds of the plant henbane. An iron rod with copper alloy fittings presumably reveals that the woman was involved in *sejd* (sorcery whereby the practitioner is rendered into a state of ecstasy). The special nature of the grave goods, as well as the presence of a chair-shaped silver amulet, suggests that the woman was a *völva* or prophetess (Roesdahl & Nordquist 1971; Pentz et al. 2009).

7.1.2.4. Dating

Dendrochronological dates around AD 980 mean that the fortress was in use, at the latest, at the same time as Trelleborg near Slagelse. The general impression gained from the Fyrkat finds assemblage is consistent with that from graves and hoards dating from the mid to late 10th century. Traces of charcoal suggest that Fyrkat was destroyed by an intense fire. Whether this was due to an accident or happened during hostilities remains, on the other hand, unresolved. It appears that the fortress was only occupied for a short period of time, perhaps 10-20 years, before it was abandoned.

7.1.3. Nonnebakken

7.1.3.1. The fortress

Nonnebakken, which lies beneath the present modern city of Odense on Funen, is a ring fortress like Aggersborg, Fyrkat and Trelleborg. Excavations here have revealed a circular rampart with a diameter of c. 120 m. Outside of this was a ditch. The ring fortress is depicted on Braunius' map of the city of Odense from 1593. Here, however, the fortress is shown with only two gateways (figure 7.5).

On Braunius' prospect from 1593, Nonnebakken is obvious at the bottom of the picture as a clearly marked circular rampart with two opposing entrances. It is also seen depicted on a copperplate by R.N. Nielsen from 1837. This shows parts of the city of Odense together with the clear remains of a striking circular rampart (figure 7.6). It was on the basis of this copperplate that it proved possible in 1952 to locate the site of ring fortress. Relative to Trelleborg, Fyrkat and Aggersborg, Nonnebakken is somewhat atypically located beneath a modern city – Odense. As early as 1909, thousands of cubic metres of earth were removed from the rampart. Today, the ring fortress has almost disappeared and the area has been built upon and is cut through by modern streets. A fragment of the rampart is protected as an ancient monument (figure 7.7).

Point investigations carried out in 1968-71 revealed that only a very few archaeological finds can, via a secure context, be linked to the ring fortress of Nonnebakken. The fortress was probably of the same diameter as Fyrkat, but it has not been possible to confirm or refute the presence of buildings, wooden structures or gateways within the rampart. Neither has it proved possible to map the possible geometrical and symmetrical construction of the fortress. In 1987/88, more recent investigations within the scheduled area revealed a clear marking of the ditch towards the NW; this proved to be V-shaped with a width of 2.5 m and a depth of 0.9 m.

7.1.3.2. Dating

Even though the archaeological remains cannot confirm unequivocally the presence of a ring fortress of Trelleborg type at Nonnebakken, the finding of the remains of a concentric ditched structure, calculations of the width of the berm relative to that demonstrated for the rampart and the construction of the V-shaped ditch, suggest that there are similarities with, for example, Aggersborg. The dendrochronological analysis of a piece of worked oak wood found in a secure context at Nonnebakken tentatively suggests a date of AD 980, i.e. the same as was the case with Fyrkat and Trelleborg. The tentative nature of the date is due to the lack of sapwood; the conclusion reached by the investigators was that if the removed sapwood was normal, and only the sapwood was lacking, the resulting date would be c. AD 980.

Due to the poor state of preservation of Nonnebakken, and the lack of adequate empirical evidence, this ring fortress has not been included in the application along with the Trelleborg-type fortresses as a component in a serial nomination to UNESCO's World Heritage List.

7.1.4. Trelleborg

7.1.4.1. The fortress

Trelleborg consisted of a main fortress and a ward (figure 7.8). The main fortress itself was fortified with a circular palisade, clad with a wooden palisade both internally and externally. On both sides the heavy oak palisades were bound together with transverse timbers. The front of the palisade reached almost 8 m in height. Filled with turves, stones and clay the wooden constructions have

survived for more than a thousand years. The width of the rampart was 17 m and its internal diameter was 136 m. Towards dry land, the rampart was further fortified with a V-shaped ditch – almost 20 m wide and c. 5 m deep (figure 7.9). Towards the outer edge of the promontory, excavations in 2008 documented the presence of a further ditch which similarly followed the course of the rampart, but which did not have anything approaching the same dimensions as the ditch towards dry land. There are four gateways in the circular rampart, one at each point of the compass. The gateways were reinforced with boulders and took the form of covered tunnels which were sealed outermost by a double gate. Charred planks have been found in all four gateways showing that they had been exposed to fire.

The inside of the main fortress was divided into quadrants by two wood-paved streets. These ran between the gateways and met at right angles at the centre, thereby forming the main axes within the fortress. Traces of a wood-paved road were also located running around the inner side of the rampart.

7.1.4.2. The buildings

In each of the quadrants within the main fortress, a block comprising four identical long-houses (of Trelleborg type) was built around an enclosed yard. The Trelleborg-type long-houses were, like the fortress, characterised by uniformity and symmetry. They had curved longitudinal walls with the greatest width in the middle and straight gables. The curved walls were built of robust vertical oak planks, and the walls had sloping external support posts which helped to carry the load of the heavy roof. The construction only includes four actual roof-bearing posts, and the weight of the roof is to a significant degree transmitted out to the curved walls and the sloping support posts outside them. The presence of entrance doors is documented in each gable as well as in the central room – one in each longitudinal wall. It appears that some of the doors were fitted with porches.

Each of the 29.4 m long buildings was divided up into three rooms. There was a middle room of about 18 m in length and a width of c. 8 m; several of these were found to contain a central stone-set hearth. The two gable rooms were both shorter and narrower. Two of the buildings had apparently had a wooden floor. Within the main fortress traces were also found of a few other types of building. On two of the four yards there was a small building and by each of the northern and western gateways was also a small square building. Furthermore, an 18.5 m long building with curved longitudinal walls was found located between the rampart and the NE block of houses.

7.1.4.3. The ward

Outside the rampart of the main fortress a ward had been built, containing 15 buildings and a cemetery. The ward was similarly protected by an outer rampart with a gateway. The buildings in the ward were 26.5 m long and had similarly curved longitudinal walls. The houses were radially arranged, with their longitudinal axes pointing in towards the centre of the circular rampart. Exceptions to this were, however, two buildings which lay parallel to each other in extension of the east-west oriented street. Five of the buildings in the ward had several pairs of internal roof-bearing posts and deviated thereby from the fortress' other buildings.

7.1.4.4. The cemetery

The cemetery, which was probably in use from the time of the construction of the fortress, comprises 135 inhumation graves containing the remains of 157 individuals (Nørlund 1948; Petersen & Woller 1989) (figure 7.10). Three mass graves have been found containing a total of 20 bodies. These were apparently of men between the ages of 20 and 35. One of the graves contained the bodies of ten individuals, of which one had a leg severed above the knee. Although there is a

majority of younger men in the graves, middle-aged men and women and children were also buried in the cemetery.

Grave goods were relatively sparse and most of the skeletons were poorly preserved. In the earlier part of the cemetery some of the deceased were, however, buried with grave goods. These comprised for example iron knives and small whetstones, but a few axe heads, beads and other ornaments were also found in the graves. One of the male graves was that of a warrior and was particularly finely equipped; its contents included parts of a small bowl of sheet bronze and a large axe with silver inlay. A rich female grave contained a bronze brooch, beads, a wooden casket and gaming pieces. The latest graves were completely empty. They date from the time after the conversion to Christianity when grave goods were no longer employed. Some of the wells located on the fortress site were also found to contain human remains. Two wells each contained the remains of two children.

Recent isotope analyses (see below) of parts of the skeletal material from Trelleborg reveal that most of those buried originated either from Norway or the Slavic area (Price et al. 2010).

7.1.4.5. Dating

A Haithabu coin minted in c. 975-80 (from the time of Harald Bluetooth), various metal artefacts (including a bronze matrix, buckles etc.), together with the general finds assemblage, result in a dating to the 10th century. This is supported by the scientific dates. Dendrochronological analyses of oak posts from the outer bridge and the palisade in the inner ditch date the fortress to c. AD 980; the timber was felled in the winter of AD 980/81.

Earlier investigations show that the fortress was only in use for a short period of time, possibly only 20 years. Trelleborg, together with the other Trelleborg-type fortresses, should probably be seen in relation to the formation of the Danish state during the later part of the Viking Age.

7.2. Similarities and differences in construction

The Trelleborg-type fortresses were, in general, built according to the same pattern and configuration. They therefore appear very uniform in construction and layout. Significant differences are, however, clearly apparent in for example the size of the fortresses and their ground plans. In the Fyrkat publication from 1977, Olaf Olsen lists the most important geometrical similarities between the structures which were employed in setting out the ring fortresses in the landscape (Olsen & Schmidt 1977:87 ff):

- The precise circular form of the rampart
- The strictly concentric location of the ditch relative to the rampart
- The location of the gateways with only a few degrees of deviation from the four points of the compass
- The straight course of the axial streets between opposing gateways
- The position of the large buildings in precisely marked-out blocks parallel to the axial streets
- The central position of the small builds on the yards within the blocks of larger long-houses

He also mentions other similarities which are not immediately related to the geometrical configuration but which underline the relationship between the fortresses:

- The structure of the rampart with a timber skeleton, timber-clad façades and a sloping outer face
- The wide flat berm along the outer foot of the rampart
- The pointed cross-section of the ditch
- The covered gateways

- The design of the streets – paved with timber
- The dominant use of vertical oak timbers
- The division of all the large buildings within the circular rampart into three rooms

Apart from a few adjustments, these observations still apply to the similarities seen between the fortresses. Mention can be made here, for example, of more recent observations with respect to the outer support posts. During the excavations at Fyrkat it was possible to demonstrate that these had stood at an angle and not, as was assumed during the excavations at Trelleborg, vertically. There is also the presence of ring roads running around the inner side of the rampart.

The Trelleborg-type fortresses also exhibit differences, of which the most significant are the following (cf. for example Ulriksen 1992; Olesen 2000; Olsen & Schmidt 1977):

- The fortresses vary in size
- Aggersborg is located above a steep coastal slope, the other fortresses are located inland alongside rivers
- At Aggersborg there is room for three blocks of buildings in each quadrant, at the other sites only one
- A ward was built at Trelleborg, containing 15 buildings with a separate defensive rampart and ditch
- An associated cemetery was found at Trelleborg and Fyrkat

Differences relating to the geometrical construction include the following:

- The diameter and area of the fortresses vary, not least between Aggersborg and the other ring fortresses
- The construction, width and fill dimensions of the ramparts vary
- The building materials used in construction of the ramparts vary
- The width of the gateways through the ramparts varies
- The width of the berms varies
- The width and depth of the ditches vary
- The length of the buildings varies
- The wall construction of the buildings varies

It is also possible that the Trelleborg-type fortresses vary in date, even though this must be by a few years at the most. Trelleborg is often perceived as being the oldest of the fortresses, and it has also the most massive defensive rampart, the widest, deepest ditch and is the only one to have been expanded via the construction of a ward.

Aggersborg's ground plan could be a further development of Trelleborg's simple block construction, whereas Fyrkat appears not to have been fully completed.

The greatest accordance is seen between Aggersborg and Fyrkat, for example in the constructional details with respect to the construction and dimensions of the ramparts. Furthermore, the diameter of Fyrkat is precisely half that of Aggersborg. Even so, the constructional differences and similarities suggest that it was the same builder who staked out the fortresses. However, it was probably local labour that organised and executed the building work.

The Trelleborg-type fortresses are far from the only Viking Age defensive works in Denmark (see below) but should be perceived as a isolated constructional phenomenon.

7.3. Long-houses of Trelleborg type

As in the case of the Trelleborg-type fortresses there are many similarities and also many differences in the construction of the long-houses constructed in association with these fortresses. Long-houses of Trelleborg type were documented for the first time during the excavations at Trelleborg. They constitute a special type of long-house of a uniform, almost stereotype construction. The buildings are three-aisled and have curved longitudinal walls. They are divided up into three rooms – a large middle room and two gable rooms – and the strict configuration of the buildings suggest that they were laid out according to a particular template. The same stringency is seen in the geometrical and symmetrical positioning of the buildings within the circular rampart. At Trelleborg, the buildings were constructed with plank-built stave walls, whereas those at Aggersborg and Fyrkat were post-built. There are also examples of long-houses with stave walls from Vorbasse, Sædding and Omgård (Hvass 1981; Stoumann 1981; Nielsen 1981; 1990).

This building type, with its characteristic central hall, is an upper-class phenomenon and it developed within an aristocratic environment. It has, accordingly, been exclusively documented at central places with manors or large farms or high-status sites such as Jelling, Omgård and Vorbasse in Jutland, Uppåkra in Scania and, of course, the Trelleborg-type fortresses (Statusrapporter fra Jelling projektet (Status reports for the Jelling Project) 2009 and 2010; Stoumann 1980; Nielsen 1980; Larsson & Hårdh 1998a; Larsson 2000).

The first buildings of the type seen in the ring fortresses of Trelleborg-type turned up in the Danish record in connection with excavations at Omgård in 1974. Here, a house of this type was found in association with a large farm from the Late Viking Age. The farmstead was excavated by Leif Christian Nielsen, who went on to find a further four examples (Nielsen 1980:190ff). The next long-houses of Trelleborg type were found by Steen Hvass at Vorbasse in connection with excavations of a large farm (Hvass 1980:159ff).

There are now numerous examples of such Trelleborg-type long-houses in the archaeological record, for example at Nørre Felding Church and Jelling. It can be concluded that this type of building is not a specifically military construction but a hall building which can be linked to uppermost social and military strata of society. The potential for receiving and entertaining guests conferred by the large hall in the middle of the house has recently been pointed out. The same applies to the opportunities for practising cult activities which this type of building provided for the magnates of the Late Viking Age.

At the Trelleborg-type fortresses, where the long houses are arranged in blocks within the rampart (at Trelleborg additionally in an arc within the ward), the dimensions of the buildings vary. The buildings at Aggersborg are 32 m in length, at Trelleborg 29.4 m and at Fyrkat 28.5 m. Long-houses of Trelleborg type have now been documented at Jelling (figure 7.11). These are generally of the same ground plan as the typical Trelleborg-type buildings. The three buildings located so far at Jelling are only 23 m in length. Like some of the buildings at Trelleborg and Fyrkat, the Trelleborg-type long-houses at Jelling have a porch associated with the entrance on both longitudinal sides, and they also have a porch at the gable end.

The internal division of the buildings is different at the Trelleborg-type fortresses and at Jelling. The long-houses at all the Trelleborg-type fortresses are divided up into fifths whereas at Jelling they are divided up into quarters. This means a fifth for each gable room in the Trelleborg-type fortress buildings and three fifths for the large central room. Conversely, at Jelling there is a quarter for each gable room whereas the central room constitute half (i.e. two fourths).

There has been much discussion over time with respect to units of measurement, not least in relation to Trelleborg, and a general suspicion of the usefulness of the old *fod/alen* system of units in a building-archaeological context. Bente Draiby is presently working on units of measurement in connection with investigations of the marking out of the Trelleborg-type fortresses and the houses associated with them (Draiby in press). This article demonstrates very clearly and unequivocally that Trelleborg's blocks and buildings were set out and built in Zealandic *alen* (= 2 Rhenish feet each of 31.835 cm), as shown by L.E. Faurholt as early as 1993 (Faurholt 1993).

'The key' to this lies hidden in the plan for the entire fortress structure. The fact that the barrack buildings in the ward were built using Southern Jutish *alen* (= 2 Roman feet each of 29.505 cm) has similarly been demonstrated. These slightly smaller buildings have a length of 94 Roman feet, whereas those inside the fortress have a length of 94 Rhenish feet. Furthermore, the Fyrkat buildings have a length of 94 Danish/English feet. The terms applied reveal the origins of these units of measurement.

However, the Roman foot often occurs on Zealand. For example the earliest of the Royal Halls at Gammel Lejre, dating from the end of the 9th century, was built in Roman feet. The next hall, in two phases, dating from the beginning to the middle of the 10th century, was built using Zealandic *alen*. The third and final Royal Hall was again built in Roman feet and was completely identical in width and length to the first hall. The only, but also the most important, difference was the very narrow gables which were due to the ratio between the width and length of the circumscribed ship formed by the sloping posts being 1:5. The hall must be coeval with the Trelleborg-type long-houses in which the width : length ratio is the same. Early long-houses of Trelleborg type all have a width : length index of 1:6, regardless of where in Denmark they occur (Draiby in press). In Bente Draiby's article, the laying out of the Trelleborg buildings in blocks is demonstrated using drawings and text, and the same approach is applied to the magnates' farmsteads/royal residences. This shows that the latter cannot have been laid out according to the same principles as the Trelleborg-type long-houses.

7.4. The builders of the Trelleborg-type fortresses

The question of who built the Trelleborg-type fortresses has occupied researchers for several decades. Even though the fortresses were very conspicuous and played an important role in the society of the time, no traces of them are found in the documentary evidence. Not one written source mentions the Trelleborg-type fortresses. But with the discovery of these fortresses we now know that the Vikings possessed a technical ability, organisational capacity and discipline which are not normally ascribed to them. This is reflected in the stringent geometrical precision found in the constructional details at all the sites.

These four geometrically-arranged ring fortresses which are distributed across Denmark bear witness to large-scale national planning, and it is clear that a king must ultimately have been responsible for these building works. We do not know whether other Trelleborg-type fortresses existed within the realm, for example in Southern Jutland. The Scanian ring fortresses, i.e. Trelleborg, Borgeby (and Foteviken) have also been proposed as possible ring fortresses of Trelleborg type, but excavations at these sites have so far not been able to confirm this. Therefore, until new evidence emerges to the contrary, only Aggersborg, Fyrkat, Nonnebakken and Trelleborg can be termed Viking Age ring fortresses of Trelleborg type.

The Trelleborg-type fortresses were not the only defensive works or monumental constructions built during the Late Viking Age in Denmark. There was also expansion and strengthening of the defensive structure Danevirke and the fortifications of towns such as Ribe, Aarhus and Haithabu.

Furthermore, mention should also be made of the building of the bridge across Raving Enge as well as the construction of the great halls, often with a surrounding palisade.

A question which is central to the interpretation of the function of the Trelleborg-type fortresses is which king was responsible for their construction. The dendrochronological dates for Trelleborg (AD 980/81) and Fyrkat (AD 979/81) suggest some uncertainty as to who was on the throne in Denmark when the fortresses were constructed. It is thought to have been Harald Bluetooth, who ruled up until AD 987, i.e. until only a few years after the Trelleborg-type fortresses were built. Written sources suggest that the transition of ruler between Harald Bluetooth and his son Svein Forkbeard was not unproblematic. It is, however, also likely that Svein Forkbeard was already nominated as co-regent from around AD 980. Co-regents were not an unheard of phenomenon, either in Denmark or in Europe, at that time. Powerful kings often had their oldest son elected co-regent in order to ensure the succession. The later German emperor, Otto II, was only six years old in AD 961 when he was elected as co-regent, and in Denmark Hardicanute appeared as king on coins from around AD 930, five years prior to the death of Canute the Great. The inscription on two contemporary rune stones should probably be seen in this perspective. One was erected by a warrior who refers to himself as Svein's houscarl. It was raised over a comrade who fell during the siege of Haithabu. On the second stone, found at Danevirke, the inscription reads that it was raised by King Svein over one of his retainers, Skarde, who died at Haithabu. Svein Forkbeard must be the King Svein referred to here. Svein Forkbeard was therefore presumably his father, Harald Bluetooth's, co-regent and Svein re-conquered Haithabu in AD 983 after his father had lost the town to Otto II in AD 974.

Regardless of whether the fortresses are ascribed to one or the other of the two rulers, it is clear that it was the Danish monarchy which was responsible for the construction of the Trelleborg-type fortresses, and that it was their aim to retain power within the kingdom.

7.5. The possible function of the Trelleborg-type fortresses

Many researchers have considered the purpose of the Trelleborg-type fortresses and, consequently, the question of the use(s) to which these impressive building works were put in the Late Viking Age (e.g. Andersen 1986; Christiansen 1971; 1982; Olsen & Schmidt 1977; Nørlund 1948; Roesdahl 1977; Nielsen 1990).

Seen from a defence perspective, the Trelleborg-type fortresses were obviously very well thought through. The turf of which they were built was probably cut from the surrounding meadows and commons land which were thereby rendered useless for grazing animals. Enormous quantities of timber were used in the construction of the buildings and the internal framework of the ramparts, as well as in the palisades and breastworks. Even if the enemy succeeded in crossing the ditch, they could be defeated on the narrow berm running around the outer foot of the rampart. The gateways did not all lead out to accessible terrain but were sited precisely there where there was impassable terrain at the face of the rampart (e.g. Jensen 2004:386 ff).

An understanding of the purpose of the Trelleborg-type fortresses is conditional, in turn, on an understanding of their function and significance – regionally, nationally and internationally. There is not general agreement with respect to the function of the fortresses, and different researchers have, accordingly, been exponents for various interpretations of their application(s)

The finds recovered from Trelleborg reflect a permanent, year-round settlement with agriculture and craft activities in addition to clear indications of war-related functions. No strong indications of agriculture have been found at Fyrkat. Conversely, there are clear signs of craft activities.

The preserved skeletal material from the cemeteries at Fyrkat and Trelleborg demonstrates that men, women and children were all buried there. At Trelleborg there is a clear predominance of younger men, and there are several mass graves, the skeletons of which bear evidence of violence.

With respect to their military function, Aksel E. Christensen and Tage E. Christiansen highlighted in particular the defensive character of the fortresses and interpreted them as garrison fortresses – i.e. directed towards internal unrest in the country. Construction of the fortresses was, accordingly, said to have been carried out on orders of Harald Bluetooth as a step in his maintenance of power in the kingdom (Christensen 1969; Christiansen 1971; 1982).

Following the excavations at Trelleborg, Poul Nørlund was of the opinion that the fortresses were (perhaps local) training camps for Svein Forkbeard's English campaigns (Nørlund 1948:158ff). He pointed out that each of the fortresses' great long-houses could accommodate a ship's crew of up to 75 men. He was not able to find any parallels to the long-houses in the Danish archaeological record but thought that the house-shaped English and Scottish grave monuments – so-called hog backs, which relate to Norse settlers in the British Isles – should be seen as the inspiration for this building type.

Olaf Olsen shared this interpretation of the fortresses' role as central point of embarkation for expeditions of conquest against the British Isles while being well aware that these took place rather late in relation to the dates for the fortresses. Now that the dates for the Trelleborg-type fortresses show that they were constructed earlier than the expeditions to England, their potential link with these campaigns is problematic. It is also problematic that very few artefacts of British origin have been found at the fortresses, suggesting that the traffic did not proceed in both directions even though the campaigns in general resulted in huge hauls. This situation was also pointed out by Olaf Olsen, who was of the opinion that the history of the Trelleborg-type fortresses should be interpreted in relation to local militia, garrison fortresses and Viking camps (e.g. Olsen 1977; 2010).

With respect to Trelleborg, Leif Christian Nielsen believed that the fortress' most important function was probably ship building together with the manufacturing of chests and caskets (Nielsen 1990:145ff). He believed that the many finds of rivets, together with iron fittings and keys, confirmed this. Parts of caskets and chests were similarly found at Fyrkat, and a large number of nails and rivets were recovered at both Fyrkat and Aggersborg. The rivets were interpreted by Leif Christian Nielsen as evidence of ship building, and as a consequence he drew the overall conclusion that Trelleborg, Fyrkat and Aggersborg were all built as fortified production sites (Nielsen 1990:170).

The idea of ship building at and near the fortresses has been proposed many times and has been prompted by, for example, the curved configuration of the Trelleborg-type long-houses. Accordingly, there are several authors who have imagined that the buildings at Trelleborg were, in reality, ships which were carried into the fortress in winter time and placed upside-down so people could live under them. It would, however, not have been possible to move ships into the actual fortresses, and any possible ship-building activities must have taken place in open country. Andres Dobat has, in conjunction with trial excavations in the wetland areas around the Trelleborg-type fortresses as part of the project 'The King's Fortresses', investigated the possible existence of ship building on the fortresses (Dobat 2009; 2010; 2011; Dobat et al. 2009). The finds resulting from these investigations include rivets, but as yet no more convincing evidence of organised ship building has been found, for example large quantities of ship components or waste material from ship construction.

Several of the researchers who have worked on the Trelleborg-type fortresses have emphasised the relative abundance of traces of craft production found at these sites relative to that seen at other localities of the same date. Else Roesdahl concludes, on the basis of her thorough analysis of the finds from Fyrkat (Roesdahl 1977), that only three of the, in all 12, excavated long-houses actually contained living quarters. Four buildings appear to have served as stores and two functioned as blacksmiths' smithies. The smithies were actual workshops with all the fixtures and fittings necessary for iron working, and the finding of copious amounts of slag bears witness to this activity. Working of bronze and precious metals is documented in three of the buildings in the form of 40 crucible fragments of and 160 fragments of so-called hot plates. No matrices were found at Fyrkat, but at Trelleborg the finds included a patris for the production of ornaments with a bird's-head-shaped eyelet as well as hot plate(s), lead ingot(s) and casting mould of soapstone (steatite). Else Roesdahl saw the working of precious metals and the production of high quality wares in precious metals for the royal owner of the fortress as being one of Fyrkat's most significant functions. She therefore suggested that the fortresses were the Crown's fortified craft and administrative centres.

In opposition to the view that craft activities at the Trelleborg-type fortresses should be linked to the monarchy is the fact that the primary function of the craftsmen was to fulfil the needs and requirements of the occupants of the fortresses. This corresponds to the picture that has emerged from the magnates' farmsteads of the same time, for example at Omgård and Vorbasse, where there traces have been found of both blacksmiths and goldsmiths. If the farmsteads themselves did not have their own metal craftsmen who mastered the casting techniques needed to produce wares in precious metals, then travelling metalworkers could have carried out commissions during their stays in the fortresses. This situation has already been seen in the case of the Mästermyr smith and the goldsmith from Haithabu Harbour. Olaf Olsen finds it difficult to believe that the craft production represented at the fortresses was of any major extent. If this were the case, it would require a proper smithy (Olsen 1977:98ff; 2010). The Trelleborg-type long-houses, with the large hall in the middle, were directly linked to the upper social strata and were built either to accommodate a large entourage and/or representative duties or cult activities. Olaf Olsen believes that when only three of the 12 excavated long-houses at Fyrkat are identified as living quarters, four as stores and five related to craft activities, this is no evidence of the original purpose of the fortress. It merely reflects that the use of these buildings differed from what was originally intended.

More comprehensive and synthetic investigations of the possible function and use of the Trelleborg-type fortresses can be found in Else Roesdahl and Olaf Olsen's individual investigations carried out in connection with the publication of the evidence from Fyrkat (Roesdahl 1977:172 ff; Olsen 1977:96 ff; 2010). In her publication, Else Roesdahl summarises the potential functions which the fortresses could have had and points out that fortresses built by strong kings would have many functions. These could be:

- Supervising and controlling the surrounding area/traffic routes (the garrison fortress idea) and guard duties
- Military support centres in times of unrest
- Strongholds for the local population in restless times (like the English Burghal Hidage sites)
- Centres for the gathering and storage of duties for the king and the king's goods and chattels
- Centres for the execution of law, minting of coinage and the organisation of large projects such as foreign campaigns
- A magnificent fortified base for royal officials and warriors
- To accommodate part of the royal family and its household

- A permanent residence for craftsmen producing wares for the king and his entourage
- A fitting residence for the king and his entourage on their travels around the kingdom

It is true of all the proposed functions that none of them excludes any of the others. Conversely, they could each individually have had a different weight under different circumstances. It is, however, important to maintain that the primary function was always to protect the owner of the fortress and his property and to maintain or reinforce his right to an area of land or a settlement. The aim could have been defensive when established rights were to be protected, whereas it would be offensive in circumstances where a conqueror built a fortress to protect his newly-acquired possessions.

7.6 The Trelleborg-type fortresses and aristocratic settlements

There is no doubt that the Trelleborg-type fortresses were considered as prestige building projects. They were constructed as part of a general militarisation of the country whereby the Danish Crown manifested itself through, for example, visible rearmament and subsequent maintenance of power in the country.

An understanding of the Trelleborg-type fortresses in a wider perspective also includes the so-called aristocratic settlements. In recent decades, very large hall buildings have been documented in several locations, for example in Gammel Lejre, which according to legend was linked to the Danish monarchy. Similar building works have been found at Tissø and Toftegård on Zealand (Christensen 1991a;1991b; Larsen 1994; Jørgensen 2002; 2009; Tornbjerg 1998). Uppåkra and Järrested in Scania and Gudme on Funen have also been described as aristocratic sites, where large farms/royal halls were found together with cult buildings and offering sites/areas (Larsson & Hårdh 1998a; 1998b). At Lisbjerg Church and Erritsø in Jutland there have been similar discoveries of large farms from the Viking Age which also appear to have had a cult area. Lars Jørgensen is of the opinion that it was the magnates of the time who, from their large farms, were responsible for several of the pre-Christian cult activities (Jørgensen 2002; 2009). A number of rune stones were erected in memory of powerful men referred to using the term *gode*. This was probably the term used for the Viking Age's heathen priests or cult leaders. This is seen for example on the rune stone from Helnæs on Funen (Moltke 1976:122).

Many of the high-status sites were fortified with palisade-like enclosures around the settlement. This is true, for example, of Gammel Lejre and Tissø on Zealand, Lisbjerg near Aarhus and now also Jelling near Vejle. The rhombic area enclosed by the palisade at Jelling is, with its dimensions of 360 x 360 m, the largest example of this so far documented in the Nordic Countries. The palisade frames the entire Jelling complex with its rune stones, burial mounds, church, a 360 m long ship-formed stone setting and, to date, three long-houses of Trelleborg type (Nationalmuseets Statusrapport for 2. halvdel af 2010 af Jellingprojektet (the National Museum's status report for 2nd half of 2010 of the Jelling Project)).

Most of these sites have a very high building density and an extensive finds assemblage. They were often continuously occupied over a long period of time. At large farms with hall buildings or long-houses of Trelleborg type, the aristocratic character is underlined by the finds which show clear signs of having belonged to the uppermost layer in society. The artefacts suggest high resource consumption and widespread contacts both nationally and internationally. The Trelleborg-type fortresses, and the finds that derive from them, also clearly show that they too had widespread contacts both nationally and internationally, even though the quantity of finds from the Trelleborg-type fortresses is less.

The aristocratic character of the fortresses deviates somewhat from that of the finds excavated in the towns of the time, as seen for example in the kitchen equipment. At Trelleborg and Fyrkat there is a predominance of soapstone vessels relative to, for example, the situation revealed by coeval finds from excavations in towns such as Ribe, Haithabu and Aarhus. There are also large differences in the finds assemblages from eastern and western parts of Denmark. For example, the royal halls with a roofed area of more than 500 m², discovered to date, are mostly on Zealand, whereas both horsemen's graves and weapon graves occur frequently in Jutland but only rarely on Zealand.

7.7. The possible origin of the Trelleborg-type fortresses – precursors and parallels

Only Trelleborg, Fyrkat and Aggersborg are definite examples of the Viking Age's ring-shaped Trelleborg-type fortresses. Investigations of the ring fortress of Nonnebakken in Odense suggest, however, that this is, in principle, a fortress of the same type as at Trelleborg, Fyrkat and Aggersborg. However, excavations have not been able to demonstrate the presence of an inner fortress area with houses symmetrically positioned relative to one another and separated by streets meeting at right angles.

The origin of these symmetrically organised ring fortresses is not clear. Circular fortresses are a well known phenomenon in both the Iron Age and Viking Age of Europe and the Nordic Countries. However, the geometrically stringent layout and construction that characterises the fortresses of Trelleborg type is only known from Denmark. There are, accordingly, no contemporaneous architectural parallels.

Sources relative to an investigation of the function and time of the ring fortresses are inadequate, and it is unclear whether there were further ring fortresses of the same type during the Viking Age. Borgeby, Foteviken and Trelleborg in Scania are considered by several researchers to be possible ring fortresses of the Trelleborg-type, but excavations have not produced any unequivocal evidence for this.

Parallels to the Trelleborg-type fortresses have been proposed in the fortified towns of the Orient by for example L'Orange (L' Orange 1953), with reference to the similarities between the ring fortresses and Caliph al-Mansur's circular town of Baghdad from AD 762 (when Baghdad was founded as the seat of the reigning monarch). The circular town wall had four gateways linked by crossing axial streets, but here, however, the similarities end. Even though the Vikings knew of the town, there is still a lack of convincing evidence in support of the stringent geometrically layout of the Trelleborg-type fortresses being constructed using these circular towns as a model.

In the Nordic, Slavic and Frisian areas there are a number of earlier circular fortresses which could possibly be precursors in the development and construction of the Trelleborg-type fortresses. In the latter, the house type and building materials are, it is true, Nordic, but the architectural stringency and the symmetry could very well have been inspired by Carolingian or Ottonian monumental architecture. This includes for example right-angled, fixed-axis structures such as Charlemagne's *Kaiserpfalzer* (imperial palaces). The most characteristic of these are at Aachen and Ingelheim (Olsen & Schmidt 1977:92 ff, 149 ff; Roesdahl 1989:158 ff).

Centres with political-military functions were common in Europe and well known to the Vikings (Roesdahl 1989:158 ff). The finds assemblages from Trelleborg and Fyrkat similarly demonstrate clear links both to the south and east to the Slavic/Baltic area (e.g. pottery and metal finds) and to the north to Norway (e.g. soapstone vessels and whetstones of Eidsborg type). The only Viking Age shield yet to be found in Denmark was discovered at Trelleborg, and it was similarly manufactured in Norway.

Circular fortresses are also known from the British Isles. One of the clearest parallels is Warham Camp Hillfort on the Norfolk coast which dates from the Iron Age. Its internal diameter averages c. 126 m, but the rampart structure is exactly circular in form. This circular fortress, which covers a area of 1.4 ha, has a double rampart and ditch, and the rampart is preserved to a height of 3 m. Some of the SW part of the rampart has been damaged by modern on-site activities. The fortress shows many similarities with the Trelleborg-type fortresses, including its location next to a river. However, the excavation results point in the direction of the fortress having been built during the the late Pre-Roman and Roman Iron Age,.

Recently, strontium $^{87}\text{Sr}/^{86}\text{Sr}$ isotope analyses were conducted on some of the skeletal material from Trelleborg. These analyses were performed on 48 individuals interred in 30 ordinary graves, both with and without grave goods. Furthermore, analyses were carried out of some of the skeletal material from the three mass graves. The investigations showed that 32 of the 48 individuals were born outside Southern Scandinavia. The three women who were investigated were all originally from abroad, and the younger men were primarily recruited in the Slavic area and in Norway (Price et al. 2010).

Some of the fortresses most central to an understanding of the Trelleborg-type fortresses will be outlined below.

7.7.1. Trelleborg in Scania, Sweden

Excavations in the town of Trelleborg in Scania in the late 1980s led to the discovery of a roughly circular rampart (Arén 1995; Jacobsson 1995; Jacobsson et al. 1995; Svanberg 1998; Svanberg & Söderberg 1999; Olesen 2000), which appeared similar to a fortress of Trelleborg type. The fortress was located a few hundred metres from the Baltic Sea on a flat hill which would have been more marked in the Viking Age (figure 7.12 and 7.13).

The rampart was c. 140 m in diameter and bordered by a trough-shaped ditch to the north, south and east, and a wetland area to the west. The rampart was cut by four gateways, of which only those to the north, east and west could be located with certainty. There were traces of earlier settlement on the site dating from the Germanic Iron Age and Early Viking Age. In the 9th and 10th centuries, the rampart had a core which had a sharply sloping outer and an evenly grading inner face. Towards the end of the 10th century the rampart was extended and given a vertical outer face with sloping posts to the outside which functioned as an escarp.

Trelleborg in Scania (phase 2) shows certain similarities with the Danish fortresses of Trelleborg type. The fortress is built of turf and earth and has a vertical palisade with an oblique escarp. Furthermore, there is a ditch with a berm running around, as well as four gateways whose deviation from the points of the compass, it is true, is rather greater than seen at the Danish fortresses of Trelleborg type. A quantity of Viking Age pottery has also been found at Trelleborg in Scania. Apart from theses similarities to the fortresses of Trelleborg type the differences are, however, generally greater.

Trelleborg in Scania was not laid out according to a stringent geometric plan but had a plan which was adapted to the terrain. Accordingly, it does not have the precise circular configuration which characterises the Danish fortresses of Trelleborg type. The ditch does not have internal timber anchoring and it is trough-shaped, in contrast to the V-shaped ditches of the Danish fortresses of Trelleborg type. Neither have excavations within the fortress been able to reveal traces of block-like arrangements of buildings or the general remains of a coeval settlement. Finally, there is a problem

with Bengt Jacobsson's interpretation of the radiocarbon dates. These seem to be too early for them to be able to confirm a date for the fortress in the second half of the 10th century (Jacobsson et al. 1995:45 ff; Olesen 2000:101 ff).

There are, accordingly, neither typological nor dating arguments for adding the Scanian Trelleborg to the Danish group of fortresses of Trelleborg type. The fortresses are probably related, but stringent geometrical construction principles and the disciplined adherence to these, which were an integral part of the purpose of the Danish Trelleborg-type fortresses and which demonstrated the builder's position of power, are not recognisable in the Scanian fortress (Olesen 2000:99 ff).

7.7.2. Borgeby in Scania, Sweden

In the course of excavations at Borgeby in Scania, traces were found of a circular fortress dating from the Viking Age (e.g. Brorsson 1998; Roesdahl 1993:254; Schietzel & Crumlin-Pedersen 1980:4 ff; Svanberg 1998:117 ff) (figure 7.14 and 7.15). It had an internal diameter of 150 m, and the ramparts were turf-built with use also being made of gravel and clay. The structure also had a palisade with escarp, berm and ditch. No timber running through the rampart was documented.

The earliest rampart was 9 m wide, with a 2 m berm and a ditch which was 6 m wide and 1.2 m deep. The outer face of the rampart was reinforced with a palisade; it is uncertain how the inner face of the rampart was constructed. In a later phase, the rampart was extended by 3 m with a wooden palisade. At a distance of 16 m from the rampart, a new, deeper ditch was cut which was 7.5 m wide and 2 m deep. The earliest phase is reminiscent of Trelleborg in Scania. The later phase has, conversely, both purely constructionally and building-historically many points of similarity with the Danish fortresses of Trelleborg type. However, this ring fortress also differs from the Danish examples by having a trough-shaped ditch. Furthermore, the palisade is more closely related to that found at Kovirke. It is uncertain whether there has been a block-like arrangement of buildings within the rampart as was the case at the Danish Trelleborg-type fortresses, but it does appear that the fortress was divided up internally into four quadrants (Svanberg & Söderberg 2000:13 ff).

The finds from Borgeby are generally reminiscent of those from the Danish Trelleborg-type fortresses. Sherds have been found of Baltic ware pottery, but also Pingsdorf vessels as well as traces of gold- and silver-working in the NW quadrant have been found (Svanberg & Söderberg 2000:37). Evidence of a workshop for the working of precious metals were also found in the courtyard house in the NW quadrant at Fyrkat, and at Trelleborg a patrix bears witness to the on-site working of precious metals (Roesdahl 1977:177 ff; Nørlund 1948). In addition to balance weights, crucible fragments, solder, pieces of silver etc., a number of moulds were also found at Borgeby (Brorsson 1998; Svanberg & Söderberg 2000). A couple of these are unique and they originate from moulds used in the production of bronze patrices. They had been used in the production of exclusive ornaments in Hiddensee style, a style which is linked to political life and royal power in Southern Scandinavia during the Late Viking Age, of which the Trelleborg-type fortresses formed a part (see below).

The ring fortress at Borgeby is possibly also a representative of the fortress-development tradition seen in the relationship between the Frisian (see below) and Danish fortresses of Trelleborg type. The Borgeby fortress is dated to the end of the 10th century – the reign of Harald Bluetooth. In the 11th century there was a royal mint-master at the site and at the beginning of the 12th century a tower was constructed in the middle of the fortress. The fortress was at this time owned by the Archbishop of Lund and, together with Lundagård and Hammershus, constituted the bishop's strongest fortification.

7.7.3. Foteviken in Scania, Sweden

In the area to the north of the town of Lille Hammar, on the western shore of Foteviken in Scania, a Viking Age ring fortress is said to have been located on the basis of studies of infra-red satellite images. The ring fortress is marked in the landscape by a slight elevation, and with its diameter of 240 m the fortress, according to P.E. Lindelof, shows great similarity to the Trelleborg-type fortress of Aggersborg (figure 7.16).

The investigations at Foteviken, which formed part of the Viking Age landscape in Southern Scania, include studies of earlier aerial photographs and normal panchromatic satellite images, red and near-infra-red satellite images as well as pan-enhanced, multi-colour satellite images. These images reveal the presence of a clearly circular ruin/anomaly in the landscape. However, the investigations have not yet been able to identify the traces definitely as the remains of a ring fortress of Trelleborg type.

7.7.4. Lyby in Rygge, Østfold, Norway

As part of a wider investigation into the impact of modern technology on the cultural landscape in Rygge Municipality in Østfold, Norway (Grøn & Loska 2002), a circular structure was localised in a cultivated field at Søndre Lyby with the aid of images from the civil, American IKONOS satellite (figure 7.17). In these images, light of different wave lengths is separated out into different layers in the digital photos (cf. 7.7.3.). In addition to the ring bank, a number of structures are evident both inside and outside the bank which are possibly the remains of buildings.

According to Frans-Arne Stylegar, the area was used for motorcycle racing around 1960 which could perhaps explain the nature of the circular structure. It is not, however, visible on aerial photographs from 1948 and 1956. Only an actual archaeological excavation would be able to reveal the true nature of the structure. The ring-shaped structure has a diameter of 140 m and it has probably been severely affected by ploughing. With an internal diameter of 114-116 m it lies close in size to Fyrkat and Nonnebakken, which both have an internal diameter of c. 120 m. The bank width of 12-13 m corresponds to the 13 m wide rampart of Fyrkat. Stylegar is of the opinion that the Lyby ring bank is more reminiscent of fortresses of Trelleborg type than any other fortress type from Scandinavia's prehistory (Stylegar 2005).

The area played a significant role in the Viking Age environment of Southern Norway. The districts around Oslo were Danish for large parts of the Viking Age, and Stylegar believes therefore that the same need for control and supervision as in Denmark could very well have existed here in Norway too, including a fortress of Trelleborg type. Several researchers have previously searched in vain for a fortress of Trelleborg type in both Oslo at Trælberg and in Tønsberg at Trelleborg. Stylegar believes that the area's links with the aristocracy can be confirmed by the name Lyby (cf. also the so-called 'Ridebanen' in Lyby near Viborg in Denmark which seems to mean 'a place where people regularly gather'. This is very appropriate to the Trelleborg-type fortresses and to the activities which took place there. The association with the aristocracy is also reflected in a hoard found at Rød, on lands owned by Værne Monastery close to Lyby. The hoard included a Viking Age filigree-ornamented gold spur which belongs to the most magnificent group of artefacts from Norway's Viking Age – in Hiddensee style, dating from the second half of the 10th century. The style was the preserve of the Southern Scandinavian elite during the reign of Harald Bluetooth. The spur is contemporaneous with the Trelleborg-type fortresses and probably had links with the inner circle of the Jelling kings.

7.7.5. Frisian, Saxon and Slavic fortresses

A number of elements in the Slavic, Saxon and Frisian ring fortresses suggest that the Vikings who inhabited them found a source of inspiration here for the building of the Trelleborg-type fortresses. Perhaps the earlier phases in the Scanian circular fortresses should also be seen in this perspective. Maybe they represent the first attempts in Scandinavia to introduce a particular type of SW European architecture in a time that was characterised by attacks by Slavic peoples from the south and from hostile campaigns waged internally in Scandinavia.

The Slavic fortresses have been dealt with in detail by Joachim Herrmann and Werner Coblentz (Hermann 1985:186-227). One of the greatest concentrations of Slavic ring fortresses lies in the area of Launitz, c. 100 km south of Berlin, where remains have been documented of almost 40 circular fortresses, each surrounded by a water-filled ditch. The fortresses date from the 9th and 10th centuries and often functioned as strongholds and fortified stores for the surrounding population. The Slavic fortresses were also often princely residences or functioned as fortified large farms/manors. Typical Slavic fortresses of roughly or approximately circular form include Cösitz, Kr. Köthen, Burg von Tornow, Burg von Behren-Lübchin and Raddusch (Hermann 1985). The Slavic ring fortress of Raddusch was investigated between 1984 and 1990. Initially it appeared as a low, vegetation-covered bank, but on conclusion of the excavations it was reconstructed and now forms the basis for a visitor centre.

The number of Slavic fortresses is greater than that of Saxon fortresses and few have a completely circular form. The fortresses that were constructed in these areas during the Viking Age (c. AD 800-1000) were generally between 50 and 100 m in internal diameter, i.e. smaller than the Trelleborg-type fortresses. In the building of the Slavic fortresses, very large amounts of timber were used in the construction of the rampart which comprised framed constructions of timber with turf. The outer face was clad with wood and was either vertical or sloping. In the rampart was a gateway. The Saxon and Frisian ring fortresses were, in contrast to the Slavic examples, built of stacked grass and heather turves. Timber was only used to a limited extent, for example in the outer face which was often vertical. Later in the history of these fortresses greater use was often made of timber in the form of reinforcing elements (e.g. Olsen 1977:91ff).

Vilhelm la Cour was one of the first researchers to investigate the Saxon and Frisian ring fortresses and he found here many similarities with the Trelleborg-type fortresses. The circular earthen ramparts of the latter did not, he believed, differ from those of the Frisian-Saxon structures other than that their enceintes followed a geometrically precise circle whereas the latter did so only approximately. In his view, the overall similarities were greater than the differences (la Cour 1963).

The Trelleborg-type fortresses generally show many similarities with the Frisian and Saxon examples, and the building of the former probably took place under the heavy influence of the latter. Even so, the ramparts of the Trelleborg-type fortresses appear less massive and robust in construction and the use of timber in them is significantly less than in the Slavic fortresses. There are also differences in the cross-section of the ditches. Whereas those of the Trelleborg-type fortresses are V-shaped, those of the Slavic fortresses are as a rule trough-shaped. Trough-shaped ditches are also seen occasionally at the Frisian and Saxon fortresses. Otherwise, the V-shaped ditch is dominant, just as is the case of the Trelleborg-type fortresses. In contrast, the berm present at the Trelleborg-type fortresses is not seen in the Frisian and Saxon fortresses, where the rampart and ditch often lie in direct continuation of one another.

The Frisian ring fortresses, which are generally between 144 and 265 m in diameter and constructed of clay and turves, have a series of features in common with the Trelleborg-type fortresses. Accordingly, the circular ramparts are very stringently laid out. They have gateways positioned at

the points of the compass, linked to the opposite gateways by roads which divide the fortress into quadrants. The gateways are, however, positioned with a somewhat greater deviation from the points of the compass than is the case with the Danish Trelleborg-type fortresses. The building types which were constructed within the fortresses are not the same as those seen in the fortresses of Trelleborg type, neither are the buildings positioned symmetrically. Even though these fortresses are, accordingly, not of the same type as the Danish Trelleborg-type fortresses, it is clear that the two types are related. They were a kind of ring fortresses intended to protect against attacks and plundering by the Vikings. The Vikings were very familiar with the geometric ring fortresses south of the border, and they probably took that knowledge with them north again following their campaigns.

Many of the Frisian (Zeelandic-Flemish) fortresses are about a century older than the Trelleborg-type fortresses. Following the death of Charlemagne in AD 814, the political and economic situation in the Frankish Empire was characterised by uncertainty as his son, Louis the Pious, was not a strong ruler. Following the death of Louis the Pious, the Frankish Empire was divided up between his three sons, Charles the Bald, Lothar I and Louis the German. The brothers were often at war with one another, and this weakened the Frankish Empire to such an extent that the Vikings had good fortune in carrying out numerous plundering expeditions, including in the Frisian areas. At the very end of the 9th century, a number of circular fortresses were, as a consequence, built in the Frisian area in places where there were royal residences, for example the Rhine area. They probably functioned as outposts on the coast for the Carolingian central power. The fortresses were intended to protect the local population against the Vikings' numerous attacks. Examples are those around the mouth of the river Schelde, including Oost-Souburg on the island of Walcheren, Burg on Schouwen, Winoksbergen and Middelburg, in addition to the ring fortresses beneath the towns of Zutphen and Deventer.

One of the most thoroughly investigated of these fortresses is Oost-Souburg (Trimpe-Burger 1975), the ground plan of which is reminiscent of the Trelleborg-type fortresses with its completely circular rampart (figure 7.18). The rampart is 10 m wide, has an external palisade, four gateways, roads etc. Its internal diameter is 135 m and therefore very close to the dimensions of Trelleborg. Conversely, the existence of a berm has not been documented and the rampart continues directly into a 16 m wide, water-filled ditch. The ring fortress at Oost-Souburg was in use from the end of the 9th century until sometime in the 12th century. Trimpe-Burger is of the opinion that the fortress was used as a base for attacks against the Vikings and as a stronghold for the local population. At Borgsum, on the island of Föhr in Northern Friesland, finds date this ring fortress to a period from the first half of the 9th century to sometime in the 11th century (Segschneider 2002:47). No remains have been located of Trelleborg-type long-houses but geophysical surveys suggest that the settlement within the ring fortress was organised radially in the same way as at Eketorp I and II on Øland (Segschneider 2002:50).

7.7.6. Iron Age ring fortresses in Scandinavia

A large number of Iron Age fortresses have been found in Scandinavia, of which many are only approximately circular. Numerous of them have today been partially reconstructed and now accommodate visitor centres or other facilities for the public.

There was a particular need for fortifications in the Baltic area during both the Iron Age and the Viking Age. On Øland and Gotland there are several ring-shaped, stone-built fortifications that were constructed during the course of the Early Iron Age. Central examples are Ismantorps Borg, Eketorp and Gråborg on Öland and the largest stronghold of Torsburgen on Gotland. Numerous

Iron Age fortresses have been located in Denmark, including Borremose, Rispebjerg, Troldeborg and Ridebanen.

Torsburgen is located high in the terrain on the east coast of Gotland, and with its area of 1.2 km² it is Scandinavia's largest fortress. On the south side of the structure there is a limestone wall which is 4-7 m high, 20 m wide at its base and 2 km long. The wall has several gateways. A tower was constructed in the northern part. The fortress was built in the Late Roman Iron Age but was also in use during the Viking Age. However, there are no traces of buildings within the fortress and the form of the fortress rampart is not circular. The fortress could probably have accommodated the entire island's population with their animals when it was in use. Today, the area around Torsburgen is a nature reserve.

Ismantorps Borg is one of the largest stone-built ring fortresses on Öland, dating from the end of the Early Iron Age. The ring wall is built of limestone and has a height of c. 3-4 m and a diameter of c. 125 m. There are nine gateways in the fortification, weakening its function as a defensive fortress. Inside, there are 88 buildings laid out radially along the inside of the wall, apparently without any system. There are also buildings present in the centre of the fortress and the structure here appears very similar to a medieval town with a square in the middle and with houses arranged along a network of streets. Ismantorps Borg has often been compared with the large Slavic fortresses, the function of which could both be protection and sanctuary.

The Öland fortresses of Eketorp and Gråborg were built during the Early Iron Age, but were also used during the Late Viking Age. The stone-built ring fort at Eketorp is today 80 m in diameter and is strategically well-sited as the island's southernmost ring fortress. It was used during three different periods – in the 4th and 5th centuries AD it functioned as a stronghold (Eketorp I), and in the 5th-8th century AD it was a permanent residence for the island's inhabitants (Eketorp II). Three hundred years later it was again put to use and functioned in the period between c. AD 1000 and 1300 (Eketorp III). The fortress today has a reconstructed ring wall (phase II) and gateways, reconstructed and marked residential houses, byres and store houses on the fortress yard. A museum has been fitted out in the reconstructed buildings in the centre. The 20 buildings from the earliest phase (Eketorp I) are marked radially, with open gables facing the centre of the fortress yard. At its full extent there were 53 buildings distributed along the inside of the fortress wall (Eketorp II). During the final phase, the wall was reinforced and an outer ring wall was built. Its greatest extent is now 115-120 m in external diameter. In its final phase, the fortress shows many traces of trade and craftwork and was linked to for example the herring fishery based on Öland.

Gråborg, which is Öland's largest Iron Age fortress, comprises today a c. 4 m high ring wall with a total length of about 640 m. It measures about 210 x 160 m and is therefore not regularly circular in shape. The earliest part is from around the 6th century AD, but it was expanded later in the 12th century when the walls were built higher and thicker and brick-built gateways were added. There were three gates with tower buildings associated with two of them. No traces of buildings have been found inside the fortress, but it was probably used as a trading centre.

In the Danish archaeological record, the defensive fortresses of the Iron Age bear witness to times of unrest in the country. It was necessary to build fortifications and other defensive structures in strategically suitable locations relative to transport routes on water and on land. This made it possible to defend and control access to, and traffic into, the different areas. Marine barrages of post and pole construction were constructed in fjords and defensive ramparts were built on land.

Rispebjerg is the largest defensive fortress from the Early Iron Age on the Danish island of Bornholm, but at the end of the Neolithic Funnel Beaker culture it was a defensive structure with a palisade. This ring fortress is located on a promontory and the inner semi-circular bank is preserved to a height of 3 m. It consists of two concentrically arranged ring banks and ditches located 200 m apart. The bank structure encircles an area of 4 ha and large parts of the outer bank and ditch are preserved. The earth bank was supported by a bole construction and the entrances were cobbled with stones. A cemetery within the fortress structure containing, to date, ten inhumation graves, provides a general date of AD 100-200. Finds of skeletal remains showing signs of violence at Rispebjerg, and at the Slusegård cemetery, located several kilometres from the fortress, also bear witness to the restless times of the period.

The ring fortress Troldborg Ring is located in a good strategic position high up on the edge of Fandens Dal which runs down to the river valley Vejle Ådal in Jutland. It was built around AD 100 and was in use throughout the Roman Iron Age until AD 400; one of the most restless times in prehistory. There was a need for effective defences to repel foreign armies originating from, for example, the Baltic area. Troldborg was used as a defensive fortress and not as a settlement. With its circular bank it is unique in Denmark for this period. With its diameter of 60 m the bank is much smaller than the Trelleborg-type fortresses.

An almost circular ring bank has also been located at Ridebanen near Lyby in the vicinity of Viborg. Even though this is modest in size it is also perceived as a stronghold for the protection of local people in times of unrest. Perhaps it also functioned as a support post for the control of movements in the area around Hagens Møllebæk, where a network of sunken roads lies between Ridebanen and the brook. The bank dates from the period between AD 500 and 1000. In the Middle Ages movements through the area shifted further to the east. The place name Lyby has been related to the area's links with the aristocracy (see above).

The best known of the Danish fortresses is probably the Borremose village in Himmerland, which is strategically well-situated on a small islet in the bog Borremose. The fortress is not circular in form, and the village is fortified with an enclosing bank and ditch. It has not proved possible to demonstrate the existence of a palisade. The houses of the fortress are today marked with low grass banks, and a stone-paved road links the village with dry land. The settlement was established in the 4th-3rd century BC, when there were at the most 15 co-existing farmsteads. People and pottery vessels were offered in the bog, suggesting that it was perceived as sacred. Borremose is considered to have been the seat of an important chieftain and functioned as such for several centuries (Martens 1988; Jensen 2003). The bank and the ditch did not in themselves constitute effective defences for the village, but this function was provided by carefully sharpened pieces of wood with a ledge at one side which would pierce the feet of any enemy that attempted to force entry to the settlement. A similar structure with the same function has been found at Lyngsmose on a hill island near Ringkøbing (Eriksen & Rindel 2001)

7.7.7. Fortifications

The Trelleborg-type fortresses were not the only defensive or other military works constructed during the Late Viking Age in Denmark. There were at this time also several fortified towns, including Ribe, Aarhus and Haithabu, all of which were surrounded by robust earthen banks (e.g. Feveile 2006; Andersen et al. 1971; Jankuhn 1986). Several bridges and roads were constructed, among them the 700 m long and 6 m wide bridge across Raving Enge near Jelling. The extensive defensive earthwork Danevirke in Schleswig was also expanded at this time. Other important defensive measures of the period were of course solid palisades and palisade-like constructions as documented for example at Gamle Lejre, Tissø and the Jelling complex (see above) (Schou

Jørgensen 1993; 1998; Statusudgravningsrapporter fra Jelling projektet (Status excavation reports from the Jelling Project) 2009; 2010). The fortified Viking Age settlements – the Trelleborg-type fortresses, the towns of Haithabu, Ribe, Aarhus, Kaupang, Birke – like the sites with royal halls (e.g. Gammel Lejre and Tissø) or high-status-sites (e.g. Jelling and Gammel Uppsala) could all be reached by water routes. The many technically well-constructed defensive works bear witness to a growing royal power and that the builder responsible (the king) had access to accomplished engineers, surveyors and craftsmen.

The large semi-circular rampart enclosing Haithabu was built around the middle of the 10th century. It is c. 1.3 km long and up to 11 m in height. By way of a connecting rampart it was joined to Danevirke and subsequently extended and reinforced many times. Several different building techniques are represented in the rampart's construction. Danevirke protected Denmark's southern border, and as the earthwork bordered onto large boggy wetland areas it blocked all land transport in the area. The main north-south route through Jutland – *Hærvejen* (the Military Road) – passes through a gateway in Danevirke close to Haithabu.

In contrast to the Trelleborg-type fortresses, Danevirke is mentioned in written sources which also tell of the problems encountered with the German Empire (see below). With its length of c. 30 km, Danevirke is one of Scandinavia's largest ancient monuments and consists of several sequences of individual banks and ramparts (figure 7.19 and 7.20). The earliest large bank was built in AD 737, but a number of further sections of bank were built over the course of several centuries and are today not equally well preserved along the whole of the monument's length. Danevirke's ramparts extend from the Schlei in the east to the rivers Rheide and Trene in the west. In connection with King Harald Bluetooth's rearmament, Danevirke was strengthened below the main rampart around AD 960/80 with two new sections of rampart – a 4.5 km long connecting rampart (dendrochronologically dated to AD 968) running between Haithabu's earlier semi-circular rampart and Danevirke's main rampart – and the slightly later 9 km long Kovirke (dated to c. AD 980) (figure 7.21). Kovirke is 3 m high and it had an associated ditch; on its outer face was a timber palisade. Kovirke and the ramparts built around the towns were not constructed in the same way as the ramparts of the Trelleborg type fortresses, even though there are certain similarities in for example building materials. The amount of timber in the contemporaneous ramparts around Haithabu and Aarhus is modest. Haithabu's rampart has, for example, a low timber reinforcement of its outer face. In Danevirke, timber was in most places only used on the outer face of the rampart. Kovirke's rampart is the most extensive; on its outer face it has a palisade with braces, which are anchored in the bank by further sloping posts. Danevirke's Kovirke's dead-straight course and the precise nature of its composition and construction bear witness to same level of the engineering expertise and execution as the Trelleborg-type fortresses, even though the construction of the ramparts at the latter appears much more complex.

8. Trelleborg-type fortresses and the Late Viking Age

Under Harald Bluetooth, Denmark developed into a Northern European superpower. Harald and his father, Gorm the Old, are also considered to be the progenitors of the Danish royal family, not least because the monarchy has existed in a straight line of succession ever since (e.g. Birkebæk 2003; Roesdahl 1989; Olsen 2010). The development of the country into a nation state was the result of warlike actions, good contacts with the Church and princely links with the Slavic area and the German-Roman Empire, and probably also Great Britain.

Documentary sources relevant to investigations of the monarchy of the Late Viking Age and the structure of society in Scandinavia are unfortunately very sporadic and inadequate. There is,

however, some available information, for example that provided on the two Jelling stones dating from AD 965. The smaller of the two Jelling stones states that Gorm was king and his wife Thyra was Denmark's *bod* (adornment). This is the first ever mention of Denmark in Denmark itself. The larger of the two stones tells of Harald who raised the stone for his parents, Gorm and Thyra, and who won all of Denmark and Norway and made the Danes Christian. The rune stones contain few but important pieces of information about fundamental political and cultural changes in the country on the unification of the realm and the growth of Christianity. Although in a somewhat simplified form, the important information that the son, Harald, succeeded his father, Gorm, can probably be used to establish that the monarchy was a reality as an institution. Harald's son, Svein, also succeeded his father and was, in turn, succeeded by his son.

With respect to the role played by the Trelleborg-type fortresses in this process, it is not possible to give an unequivocal answer. Many researchers, most recently Andres Dobat, have argued that the Trelleborg-type fortresses played an important role in the unification of the realm and that they were used to maintain control over the various parts of the kingdom (Dobat 2009). The dendrochronological analyses which give a construction date for the Trelleborg-type fortresses of AD 980, provide a date which is a little late relative to the unification of the realm. The Jelling stone is dated to AD 965, and unification must have taken place prior to this. This conclusion is of course conditional on the various dates being correct.

Perhaps the Trelleborg-type fortresses represent more of a testimony that the unification of the realm had already taken place and that one of their functions was to maintain power for the ruling monarch Harald Bluetooth, both internally in Denmark and externally in countries abroad.

8.1. The monarchy and the magnates

The colossal amount of work invested in the building of the Trelleborg-type fortresses, both in terms of human and material resources, bears witness under any circumstances to a builder and a king who must have had major political support from the country's magnates. The garrisons for the fortresses were probably recruited from magnates' families or from the largest royal residences. The Trelleborg-type long-houses were, as mentioned previously, linked both to the fortresses and to aristocratic settlements. In the fortresses, the buildings were probably built to accommodate large groups of people and/or cult activities. They were built in order to house magnates and their entourages and, with their uniform layout of a great hall and central hearth in the middle and smaller rooms at the gables, they would have been very familiar from home.

The king was chosen by the free men of the country from members of the family (e.g. Olsen 2010; Roesdahl 1989). The king's position of power built on ownership of land and the *hird* (his retainers or housecarls) he surrounded himself with. Members of the royal housecarls were closely linked to the king and were recruited in particular from the sons of magnates. The *hird*, which possibly comprised more than 50 men, followed the king everywhere on his travels.

The king's landed property comprised royal land (*kongeleiv*, i.e. Crownlands), which belonged to the title of monarch and could not be divided, and the estate land (the patrimony), which, on the death of the ruling monarch, was divided between his heirs. Division of the family estate often led to numerous murders within the family in order to reduce the number of heirs. The extent of the Crownlands during the Viking Age is uncertain as no contemporaneous written sources exist which can reveal this prior to King Valdemar's Cadastre from c. 1230. The impression gained is, however, that the Crownlands were considerable.

The patrimony was distributed across numerous properties around the country and in King Valdemar's time these numbered 30 on Zealand and 50 in Jutland. They were run by the king's provosts who were his local representatives. The provost took care of the king's interests and secured income for the king. Perhaps an equivalent situation existed during the Late Viking Age.

The king's economic foundation comprised primarily the proceeds and yields from the official and personal landed estates. In addition, there was income from towns and trade as well as tolls for passage and the minting of coins (Roesdahl 1989:85). Actual taxes are not documented in the sources. When the king travelled around the country, the local population had a duty to provide subsistence for the king and his entourage during the time he stayed in the area.

The king had the right to mobilise the population for a militia and as crew for offensive expeditions; this could not be achieved without the support of magnates. This was the monarchy's actual meaning and foundation. A strong king would have undoubtedly been able to make greater demands on his subjects than simple formation of a defensive militia. The Trelleborg-type fortresses were, together with the other major building works such as the bridge across Ravning Enge, the ramparts of Kovirke and those around the Viking towns, actual evidence of such a right and a power. The requirement for the realisation of these monuments was the enormous investment of labour and materials.

8.2. Alliances outside Denmark

Building of the Trelleborg-type fortresses and other major military facilities following unification of the realm must be seen, at least in part, as being the result of external threats. In the second half of the 10th century, the Danish areas were, as mentioned above, characterised by a series of fundamental changes consequent on a change in religion and unification of the realm. Relationships with the strong Northern European countries, the German-Roman Empire and England changed all this. The text on the large Jelling stone about Harald Bluetooth making the Danes Christian raises the question of why Harald adopted Christianity and allowed himself to be baptised in AD 965. Many explanations have been proposed, but seen in the light of the political developments in the Denmark of the time and in the countries round about, it seems very likely that Harald Bluetooth wanted to strengthen the monarchy internally and to avoid external conflicts – especially with the German Empire.

It was of central significance in the political life in Scandinavia to forge alliances with countries outside. In Denmark there were, as already mentioned, close connections with the West Slavic peoples, especially those groups who lived close to the border areas. The Royal Frankish Annals report, at the beginning of the 9th century, an alliance between the Danes (under King Godfred) and the West Slavic tribe the Veleti on one side against the Franks and the West Slavic group the Abodrites on the other. The Abodrites did, however, switch sides several times subsequently. The Scandinavian kings, including the Danish kings Harald Bluetooth and his son Svein Forkbeard, entered into alliances with the Slavic peoples and married Slavic princesses. Harald Bluetooth was married to the Abodrite king Mistivoi's daughter Tove. Svein Forkbeard in the first instance married Gunhild who was the daughter of Mieszco of Poland. His second marriage was to the Nordic Queen Sigrid the Haughty, who had previously been married to the King of the Swedes, Eric the Victorious.

Harald Bluetooth was at times also under pressure from Norway, from where Viking armies carried out plundering raids on Danish coastal areas. Aggersborg could, in this respect, have been the base for the Danish king's assertion of his supremacy in Norway. The king had perhaps also, according to European examples, reckoned on duties from traffic – both by road and by sea from merchant

ships and ships on raiding expeditions. Perhaps Aggersborg was intended as a base for the king's men who were to raise income from piracy, foreign plundering raids and regaining control of Norway (Roesdahl 1986:92).

However, when Harald had won for himself the whole of Norway, as it states on the large Jelling stone, Norway no longer represented a significant threat to the Danish Kingdom. A large part of Southern Norway (Viken) was in Danish hands and Hakon Jarl (Håkon Ladejarl) from Vestlandet had built up his position of power with armed support from Denmark. He acknowledged completely Denmark as sovereign and took part with his men in Denmark's battle against the Germans in Southern Jutland in AD 974. Despite the fact that there were certain problems between Hakon Jarl and Harald Bluetooth, the good relationship with Denmark was maintained and Hakon's sons supported Denmark in the later battle against Olav Tryggveson.

8.3. Harald Bluetooth and the German Empire

There were good relations between the Danish king and the German-Roman emperor, Otto I (king AD 936-73, emperor from AD 962). Harald's baptism and his adoption of Christianity were in all probability politically founded and had the intention of convincing Otto I of the Danish king's and the Danish people's good intentions with respect to becoming valid members of Christian Europe. It is uncertain whether this move was due to German pressure and whether Harald's relationship with the Christian Church was accordingly a forced one. Under any circumstances, the position taken by the monarchy and its actions in these matters were of crucial significance for both the country and the monarchy itself. It was important to be able to shape the country's own foreign policy and not simply be subject to German sovereignty. Up until the death of Otto I in AD 973, the situation between the two kingdoms remained unchanged, even though the written sources suggest that a Danish revolt was under way. The powerful duke of Saxony, Herman Billing, died shortly after Otto I, and it is possible that Harald exploited the opportunity to shift the balance of power. There is no doubt that the ring fortresses played an important role in this power play.

Otto I was succeeded by his son Otto II (AD 973-83), and in contrast to the alliance with his father things did not go very well for Harald Bluetooth in his collaboration with the powerful new ruler. Prior to and during the construction of the Trelleborg-type fortresses, Denmark was, as a consequence, in conflict with the Ottonian emperor. This resulted in massive pressure on Denmark and the occupation of Southern Jutland for several years. In AD 974, the conflict with Otto II led to Harald crossing the border (the river Eider) with his army. They burned and ravaged the area between the rivers Eider and Elbe. However, Otto II responded and gathered an army which was large enough to repel Harald's attack. The conflict ended with Otto II conquering the most important town in the Danish Kingdom, Haithabu, and building a border fortress there.

Almost ten years elapsed before the Danish king managed to re-conquer the lost lands. In AD 982, Otto II suffered a major and devastating defeat at the hands of the Arabs at Cortone in Southern Italy, and he died the following year in Rome while in the process of planning a new campaign against his enemy. In AD 983, Danes and Slavs joined forces against the expanding German Empire which was repelled. Slavic groups to the east of the Elbe staged a revolt and Hamburg was put to the torch by the Abodrite king Mistivoi (Harald's father-in-law). The Danes now ravaged again between the Eider and the Elbe, and this gave more acceptable relations at the border to the south. Haithabu was re-taken in AD 983 and it seems to have been Harald's son Svein Forkbeard who re-conquered the town for Denmark (see above). Immediately prior to or at the same time as all these events, further militarisation of the country was in progress with the construction of the Trelleborg-type fortresses and other monumental building works.

Even though Haithau was back on Danish hands, German interests in Denmark were, however, far from forgotten. Accordingly, the letter of immunity from AD 965 was renewed in 988. Originally, in the old privilege charter from AD 965, the episcopal residences of Ribe, Slesvig and Aarhus were exempted from all duties to the German emperor. Now, together with Odense, they were included in the new agreement. It is, however, unclear how the letter should be understood. It is far from certain that Harald recognised German supremacy over Denmark and the documentary sources also clearly testify to the very opposite. The letter should perhaps be seen more as an expression of empty German imperialism.

The successes south of the border stood in stark contrast to the situation at home where some years later, according to the written sources, civil war broke out. It is unknown whether this was a conflict between Jutland and Zealand, and whether it resulted from different power systems in Western and Eastern Denmark. Under any circumstances, Svein Forkbeard took power from his father Harald Bluetooth, who was betrayed by his army. Harald fled southwards and apparently died in Iumne (the Jomsborg of the Sagas), a large trading centre on the island of Wolin.

When Svein Forkbeard became king (c. AD 987-1014), he focussed his attention on England as there were good opportunities there to acquire large quantities of silver. The first years of his reign were, however, still influenced by problems with the Slavic lands to the south of the Baltic, but between c. AD 990 and AD 1013, when Svein conquered the whole of England, expeditions were mounted to the country with consequent large payments of Danegeld.

9. Conclusion

As is also the case with Jelling, the Trelleborg-type fortresses have not left any traces in the written sources of the time. Neither is there mention of them some centuries later, in the 12th and 13th centuries, when the history of Denmark was written down.

As for the precise role played by the Trelleborg-type fortresses during the Late Viking Age and whether they functioned according to their intended purpose, it is not possible to reach a clear conclusion. The uniformity of the Trelleborg-type fortresses shows that they must have been built by a central power. As they were built during the reign of Harald Bluetooth, perhaps their construction was prompted by the conflicts between the king and his son Svein Forkbeard. It seems just as likely, however, that they were built as part of the defences against the threats posed by neighbours to the south.

The fortresses must have been primarily occupied by warriors (and their families) and they also have a clear military character. The finds from Trelleborg – in the form of the many weapons, especially arrowheads, as well as the mass graves and skeletons showing signs of violence – bear witness to the fact that the fortress played a role in warlike events. All the fortresses functioned for a relatively short period and these unique structures, which bear witness to the strength of the monarchy of the Viking Age, were quickly allowed to deteriorate. The buildings were not repaired and the artefacts all seem to date from a time prior to AD 1000. The rampart at Fyrkat quickly collapsed and this fortress was never occupied to its full extent. Only three of the 12 Trelleborg-type long-houses excavated at the site were used as living quarters while the remainder functioned as stores or workshops. The situation at Fyrkat cannot be seen as direct evidence of the original purpose of the fortresses. The finds perhaps reflect a different use of the fortress to that which was originally intended.

The Trelleborg-type fortresses of Aggersborg, Fyrkat and Trelleborg, as mentioned above, represent the most prominent archaeological evidence of the monumental and defensive building works of the Viking Age. With their uniform and geometrically stringent ground plan and their technically accomplished character, they represent unique examples of the Vikings' abilities and competence in geometry, surveying, architecture and engineering.

The positions of the Trelleborg-type fortresses in the landscape demonstrate that they had a clear strategic purpose. They are linked with the Jelling complex and the extension phase in the fortification of Kovirke/Danevirke in connection with the unification of the Danish kingdom referred to on the large Jelling stone. Unification is ascribed to Harald Bluetooth, who is considered to be the builder of the Trelleborg-type fortresses. The dead straight course of Kovirke and radiocarbon analyses dating it to the time around AD 980 make it seem plausible that Kovirke and the Trelleborg-type fortresses had the same master builder. The Trelleborg-type fortresses, Jelling and Kovirke/Danevirke can each be considered as belonging within the same historical context, and they are all included as part of this transnational application for nomination to UNESCO's World Heritage List. They each represent a significant element in the protracted process which led to the integration of Scandinavia into the European cultural community and the formation of the Scandinavian states.

In their architecture and execution, the Trelleborg-type fortresses are unique in the world, and there are, accordingly, no parallels of the same date anywhere in the Nordic Countries or in Europe. It is not completely certain where the Vikings found inspiration for the construction of the Trelleborg-type fortresses. But the type was probably developed in Denmark, inspired by a number of earlier fortresses in the Slavic areas and along the coast of Flanders and Northern France. Several circular fortresses in Scandinavia have elements in common with the fortresses of Trelleborg type but do not themselves belong to the actual type. Despite a greater number of differences than similarities, Borgeby and possibly also Trelleborg and Foteviken in Scania are the Scandinavian ring fortresses which presently show the greatest resemblance to the fortresses of Trelleborg type.

At both Trelleborg and Fyrkat, the finds demonstrate clear contacts with the Slavic and Baltic areas and with Norway. This applies for example to the large quantities of Slavic pottery (Baltic ware). Large quantities of sherds of imported Baltic ware pottery were found at Trelleborg and at Aggersborg this type of pottery is also present in relatively large amounts. At Fyrkat, in contrast, only smaller quantities were encountered. Large amounts of Slavic pottery were also found at the Viking Age settlements of Vorbasse, Omgård, Herrup, Aarhus and Trabjerg (Hvass 1981; Nielsen 1981; Jørgensen & Skov 1980; Skov 1979; Madsen 1971).

Finds from the Trelleborg-type fortresses also include numerous different metal artefacts which demonstrate contacts both towards the south and east. For example an East Baltic triangle pin, a horseshoe brooch and a bronze chain of double rings at Trelleborg, whereas the finds from Fyrkat include a chain of copper alloy and a Gotlandic box-shaped brooch. Connections with the south are demonstrated by quernstones of Rhenish basalt which were found at both Fyrkat and Trelleborg.

The connections with Norway are underlined by numerous artefacts found at the Trelleborg-type fortresses. Both Trelleborg and Fyrkat yielded vessel fragments and moulds of soapstone from Norway. Sherds of soapstone vessels were also found at Aggersborg. The numerous whetstones made of slate of Eidsborg type found at the Trelleborg-type fortresses also originated from Norway. Denmark's only shield from the Viking Age was recently found at Trelleborg (Dobat 2010; Dobat et al. 2009). The shield measures 85 cm in diameter, 5-8 mm in thickness and had been painted using

red and white colours. It is made of pine wood which was felled in Western Norway. The latest of the 137 tree rings is from AD 905, but some decades should be added to this date.

A special group of ornaments from the later part of the Viking Age which has also been encountered at the Trelleborg-type fortresses attracts particular attention. The Danish fortresses of Trelleborg type and Borgeby in Scania produced finds of filigree ornaments and traces arising from the manufacture of exclusive ornaments in the so-called Hiddensee style (named after the gold hoard from Hiddensee on Rügen from the second half of the 10th century), which is known from the old Danish kingdom. This ornament type is represented by a magnificent example in gold in the Hiddensee hoard and by several patrices in Haithabu. The filigree-decorated circular brooches are most often of silver but occasionally also of gold (Paulsen 1936; Schietzel & Crumlin-Pedersen 1980; Roesdahl 1977; Jansson 1991).

Direct parallels to the Hiddensee ornaments have, in addition to Sigtuna (small pendant of gold filigree) and Haithabu, also been found at the Trelleborg-type fortresses of Fyrkat, Nonnebakken and Trelleborg. At Trelleborg, there is evidence both of the production of these ornaments and the fact that they were worn, whereas at Fyrkat and Nonnebakken only the ornaments themselves have been located. Characteristic finds from Trelleborg are a patrix for the production of ornaments with the characteristic bird's-head-shaped eyelet (Roesdahl 1977:35 ff). At Nonnebakken, three circular filigree silver ornaments were found. This ornament type is represented in several Danish hoards, and ornaments in Hiddensee style have also been found in Poland (including a fragment of silver ornament from the silver hoard at Wolin) and Norway (the gold hoard from Rød, on the lands of the Værne Monastery in Østfold). The gold spur from Rød is considered by many researchers as one of the most secure pieces of archaeological evidence for Danish supremacy in Viken and the Oslo area at the end of the 10th century. The casket hinges from Jelling also have ends formed as stylised birds' heads.

There is a direct connection between the filigree ornaments and the uppermost echelons of society, and they represent, accordingly, the most exclusive ornaments of the late 10th century in Southern Scandinavia (e.g. Brorsson 1998; Roesdahl 1993:254; Schietzel & Crumlin-Pedersen 1980:4 ff; Svanberg 1998:117 ff). It appears that ornamental brooches with filigree and granulation were not manufactured solely in early urban centres of major political significance (such as Lund, Viborg, Sigtuna and Haithabu) but also at the aristocratic sites where the wearers of the filigree brooches lived (e.g. Mammen) and at the royal fortresses – i.e. those of Trelleborg type. The presence of Hiddensee style ornaments at the fortresses of Trelleborg type, Haithabu, Sigtuna etc. links them with the Jelling kings and Harald Bluetooth.

A special type of building also linked to the aristocracy is the Trelleborg-type long-house with its almost uniform construction. This type of building, with its characteristic large hall in the middle, was developed within the aristocratic environment and has been exclusively documented at central places with large farms/manors, high-status sites and at fortresses of Trelleborg type.

The fact that the Trelleborg-type long-houses only appear at sites that are linked with the uppermost strata of society is an example of the fact that the Vikings maintained a cultural identity that was employed in special environments across great distances. The links between countries can often be traced in the archaeological record. Artefacts (e.g. ornaments and weapons) of foreign manufacture are often found at Danish localities, and artefacts produced in Denmark have been found at numerous localities across Europe.

In the Viking Age it was of great importance in certain areas to maintain a common Nordic identity over great distances, for example in the form of Nordic stylistic features on ornaments.

Investigations of Viking Age buildings in the North Atlantic area have shown that the classic wooden Viking Age house from Scandinavia, with its curved longitudinal walls, can be recognised in stone-built versions of the same house type in the immigration areas of the North Atlantic. These houses are seen as showing that the Scandinavians took their architecture and their building traditions with them and that they had a clear concept of how their house should appear (Larsen & Stummann Hansen 2001:117 ff).

The newly-published strontium analyses of skeletal material from Trelleborg bear witness to the Slavic and Norwegian links which are seen reflected in the archaeological record from the Trelleborg-type fortresses, regardless of whether these represent people who came to Denmark due to alliances or marriage, as merchants, craftsmen, slaves or mercenaries. In addition to the clear connections between Denmark and these areas in the Viking Age, they also testify to the presence of a multi-ethnic society which existed in Denmark more than a millennium ago.

The Trelleborg-type fortresses are perceived as royal fortresses and they reflect the extent of the high political and military power games of the time. They should be seen as monumental and military manifestations of the central power of the Late Viking Age. They fulfil a role as icons of the Viking Age, and they occupy a central position in our historical consciousness and awareness.

10. Bibliography

Andersen, H. 1984: Ringborgens alder. *Skalk* 1984, 2: 15.

Andersen, H. 1986: Ringborgene og den militære begivenhedshistorie, *KUML* 1986:7-16

Andersen, H.H.; P.J. Crabb & H.J. Madsen 1971: *Aarhus Sønder vold, en byarkæologisk undersøgelse*. København.

Andersen, H.H. 1977: *Jyllands vold*. Med bidrag af H.J. Madsen og O. Voss. Wormianum.

Andersen, S. W. 1996: *The Viking Fortress of Trelleborg*. Slagelse.

Arén, E. 1995: Trelleborgenes dobbelvall. En tolkning utifrån trätekniska och arbetstekniska argument. *Beretning fra fjortende tværfaglige vikingesymposium*, 23-51. København.

Birkebak, Frank 1985: *Harald Blåtand og hans tid*. Munksgaard 1985.

Bonde, N. & K. Christensen 1982: Trelleborgs alder. Dendrokronologisk datering. *Aarbøger for nordisk oldkyndighed og historie* 1982:111–152.

Brinck, Stefan (ed.) 2008: *The Viking World*. London

Brorsson, T. 1998: In the workshop of the Viking Age goldsmith. Gold- and silverwork at Borgeby in Scania, southern Sweden. *Fornvännen* 93:225-239

Christensen, A.E. 1969: *Vikingetidens Danmark*. København

- Christensen, K. & Bonde, N. 1992: Dateringen af Trelleborg - en kommentar. *Aarbøger for Nordisk Oldkyndighed og Historie*, 1991:231-236.
- Christensen, T. 1991a: Lejre Beyond Legend – The Archaeological Evidence. *Journal of Danish Archaeology*, vol. 10, 163-185.
- Christensen, T. 1991b: *Lejre- syn og sagn*. Roskilde
- Christensen, T. 2008: Lejre and Roskilde. In S. Brinck (ed) 2008: *The Viking World*. London, 121-125.
- Christiansen, T.E. 1971: Træningslejr eller tvangsborg, *Kuml* 1970:43-63.
- Christiansen, T.E. 1982: Trelleborgs alder. Dendrokronologisk datering. Træningslejr eller tvangsborg. *Aarbøger for nordisk oldkyndighed og historie* 1982:84-110.
- Dobat, A.S. 2009: The state and strangers: the role of external forces in a process of state formation in Viking Age south Scandinavia (ca. AD 900-1050) *Viking and Medieval Scandinavia* 5: 65-104.
- Dobat, A.S. 2010: Die südschandinavischen Burgen vom Typ Trelleborg. I: M. Segschneider (Red.), Ringwälle und verwandte Strukturen des ersten Jahrtausends n. Chr. *An Nord- und Ostsee. Schriften des Archäologischen Landesmuseums, Ergänzungsreihe Bd. 5*. Neumünster: Wachholz Verlag. 41-70.
- Dobat, A.S., P.T.Mandrup & K. Christensen 2009: Trelleborgskjoldet. *Skalk* 2009, bd.5, 3-7.
- Dobat, A.S. (red.) 2011: *Kongens Borge. Undersøgelser under Projektet Kongens Borge 2007-2010*. Udkast til manuskript.
- Draiby, B. 1994: Noter til Lejrehallen Konstruktion og Rekonstruktion. In A.-C. Larsen (red.), 1994: *Kongehallen fra Lejre – et rekonstruktionsprojekt*. Teknisk Rapport Nr.1. Historisk-Arkæologisk Forsøgscenter, 27-34.
- Draiby, B. 1999: Arkitektur og Bygningskunst i ældre vikingetid. I M. Rasmussen (red.), 1999: *Hal og Højsæde i vikingetiden. Et forslag til rekonstruktion af kongehallen arkitektur og indretning*. Teknisk Rapport Nr.5. Historisk-Arkæologisk Forsøgscenter, 31-50.
- Draiby, B., in press: *Trelleborg og Trelleborghuse – om måleenheder og afsætning*.
- Draiby, B. & J.Komber 1999: Rekonstruktion af Kongehallen fra Lejre. I M. Rasmussen (red.), 1999: *Hal og Højsæde i vikingetiden. Et forslag til rekonstruktion af kongehallen arkitektur og indretning*. Teknisk Rapport Nr.5. Historisk-Arkæologisk Forsøgscenter, 9-20.
- Eriksen, P. & P.O. Rindel 2001: Et vestjysk Borremose-anlæg fra ældre jernalder. *Fra Ringkøbing Amts Museer*.
- Eriksen, P., T. Egebjerg, L.H. Olesen & H. Rostholm 2009: *Vikinger i vest. Vikingetiden i Vestjylland*. Jysk Arkæologisk Selskabs Skrifter 70.
- Feveile, C. 2006: Ribe Studier. *Det ældste Ribe. Udgravninger på nordsiden af Ribe Å 1984-2000*. Bind 1.1 og bind 1.2. Jysk Arkæologisk Selskabs skrifter 51.

Faurholt Jensen, L. E. 1993: *Vikingernes Danmark*. Aalborg

Grøn, O. & A. Loska 2002: *Development of methods for satellite monitoring of cultural heritage sites*. Riksantikvaren. Oslo.

Herschend, F. 1993: The origin of the hall in southern Scandinavia. *Tor*, 25: 175-199.

Hermann, J. 1985, *Die Slawen in Deutschland*. Berlin

Herrmann, J & W. Coblenz 1985: Bugen und Befestigungen. In Hermann, J. 1985, *Die Slawen in Deutschland*, 186-227

Holmberg, R. 1977: *Den skånska öresundskustens medeltid*. Acta Archaeologica Lundensia. Series in 8°, No 11. Lund.

Hvass, S. 1980: Vorbasse. The Viking-age Settlement at Vorbasse, Central Jutland.. *Acta Archaeologica*, 50, 1979: 137-172.

Iversen, M.(ed) 1991: Mammen. Grav, kunst og samfund i vikingetiden. *Jysk Arkæologisk Selskabs Skrifter XXVIII. Århus*

Jacobsson, B. 1995: Utgrävningen av borgen i Trelleborg, Skåne. *Beretning fra fjortende tværfaglige vikingesymposium*, 12-22. København.

Jacobsson, B, E. Arén, E. Arén & K.A. Blom 1995: *Trelleborgen – en av Harald Blåtands danska ringborgar*. Trelleborg.

Jankuhn, H. 1986: *Haithabu. Ein Handelsplatz der Wikingerzeit*. Neumünster.

Jansson, I., 1991: År 970/971 och vikingatidens kronologi. In Iversen (ed.) 1991: Mammen. Grav, kunst og samfund i vikingetiden. *Jysk Arkæologisk Selskabs Skrifter XXVIII. Århus*, 267-284.

Jensen, J. 2003: *Danmark Oldtid. Ældre Jernalder 500 f. Kr.-400 e.Kr.* København

Jensen, J. 2004: *Danmark Oldtid. Yngre Jernalder og Vikingetid 400-1050 e.Kr.* København

Jensen, L.B. 1986: *Aggersborg og omegn i vikingetiden*. Limfjordsmuseets småskrifter nr. 6. 1986.

Jensen, N.M. & J. Sørensen 1990: Nonnebakkenanlægget i Odense. *Kuml* 1988/89:325-333. 116. Højbjerg: Jysk Arkæologisk Selskabs Skrifter.

Jeppesen, J. & Madsen, H.J. 1990: Stormandsgård og kirke i Lisbjerg. *Kuml* 1988-89:289-310.

Jeppesen, J. & Madsen, H.J. 1997: Trækirke og stormandshal i Lisbjerg. *Kuml* 1995-96:149-171.

Jeppesen, J. 2004: Stormandsgården ved Lisbjerg Kirke. Nye undersøgelser. *Kuml*, 2004:161-180.

Johannesen, K. 2001: Naboskab. *Skalk* 2001, 5:13-17.

Jørgensen, L. 2002: Kongsgård - kultsted - marked. Overvejelser omkring Tissøkompleksets struktur og funktion. In K. Jennbert, A. Andrén & C. Raudvere (red.) *Plats och praxis. Studier av nordisk förkristen ritual*. Nordic Academic Press: Lund, 215-247.

Jørgensen, L. 2009: Pre-Christian cult at aristocratic residences and settlement complexes in Southern Scandinavia in the 3rd to 10th centuries AD. In U.von Freeden, H. Friesinger & E. Wamers (red.) *Glaube, Kult und Herrschaft. Phänomene des Religiösen im 1. Jahrtausend n. Chr. in Mittel- und Nordeuropa*. Kolloquien zur Vor- und Frühgeschichte, Band 12, 329-354. Dr. Rudolf Habelt GmbH: Bonn.

Jørgensen, M. Schou 1993: Landtransport. In Hvass, S. & B. Storgaard: *Da Klinger i Muld. 25 års arkæologi i Danmark.*, 228-230.

Jørgensen, M. Schou 1998: Den berømte bro. *Skalk* 1998:5

Larsen, A.-C. (red.) 1994: *Kongehallen fra Lejre- et rekonstruktionsprojekt*. Teknisk Rapport Nr. 1. Historisk-Arkæologisk Forsøgscenter.

Larsen, A.-C. (ed) 2001: *The Vikings in Ireland*. Roskilde.

Larsen, A.-C. & S. Stummann Hansen 2001: Viking Ireland and the Scandinavian Communities in the North Atlantic. In A.-C. Larsen (ed.), 2001, *The Vikings in Ireland*, 115-126.

Larsson, L. 2000: Skånske skatte. *Skalk* 2000:6.

Larsson, L. og B. Hårdh 1998a: Uppåkra – en hövdinga- eller kungasäta. *Fornvännen* 1998. Stockholm

Larsson, L. og B. Hårdh 1998b: *Centrala platser – centrala frågor. Samhällsstrukturen under järnåldern*. Acta Archaeologica Lundensia Series in 8, No. 28. Lund.

La Cour, V. & H. Stiesdal 1963: *Danske Voldsteder fra Oldtiden og Middelalder*. Hjørring.Amt. København

Lindelof, P.E 2011: En stor vikingetids ringborg ved Foteviken:
http://www.lindelof.info/en_stor_vikingetids_ringborg_ved.htm

L'Orange, H.P. 1953: Trelleborg-Aggersborg og de kongelige byer i Østen. *Viking* XVI, 307-331.

Martens, J., 1988: Borremose Reconsidered. *Journal of Danish Archaeology* vol. 7, 159-181.

Moesgaard, J.C. 2009: Harald Blåtands ”Jellingemønter” cirka 975-985. *Nordisk Numismatisk Unions Medlemsblad*, nr. 2, maj 2009, 43-46.

Moltke, E. 1976: *Runerne I Danmark og deres oprindelse*. København.

Nielsen; L.C. 1980: Omgård. A Settlement from the Late Iron Age and the Viking Period in West Jutland. *Acta Archaeologica*, 50, 1979:173-208.

Nielsen, L.C. 1990: Trelleborg. *Aarbøger for nordisk oldkyndighed og historie* 1990, 105–178.

- Nørlund, P. 1948. Trelleborg. *Nordiske Fortidsminder IV, 1*. København: Det Kongelige Nordiske Oldskriftselskab.
- Olesen, M.B. 2000. Trelleborg eller ej? – om den skånske trelleborgs tilknytning til de danske ringborge. *Kuml* 2000: 91-112.
- Olsen, O. 1962: Trelleborg-problemer. *Scandia* 28, 1962:92–112.
- Olsen, O. 2010: *Vikingeborgens formål*. Forelæsning Trelleborg-seminaret i Jelling 13/3 2010.
- Olsen, O. & H. Schmidt 1977: Fyrkat-en jysk vikingeborg 1: Borgen og bebyggelsen. *Nordiske fortidsminder Serie B 3*. København: Det Kgl. Nordiske Oldskriftselskab.
- Paulsen, P. 1936: *Der Goldschatz von Hiddensee*. Leipzig
- Petersen, S.B. & T. Woller 1989: Trelleborggravpladsen til revision. I: L. Jørgensen (Red.), Simblegård-Trelleborg. Danske gravfund fra Førromersk Jernalder til Vikingetid. *Arkæologiske skrifter 3* (København) 262–319.
- Pentz, P., M.P. Bastrup, S Karg & U. Mannering 2009: Kong Haralds vølv. *Fra Nationalmuseets Arbejdsmark*, 215-232.
- Price, T.D., K.M. Frei, A.S. Dobat, N.Lynnerup & P.Bennike 2011: Who was in Harold Bluetooth's army? Strontium isotope investigation of the cemetery at the Viking Age fortress at Trelleborg, Denamrk. *ANTIQUITY* 85 (2011): 476-489.
- Randsborg, K. 1980: *The Viking age in Denmark: the formation of a state*. London: Duckworth.
- Roesdahl, E. 1976: Fyrkat-sølv. *Skalk* 1976, 5..
- Roesdahl, E. 1977: Fyrkat-en jysk vikingeborg 2: Oldsagerne og gravpladsen. *Nordiske fortidsminder Serie B 4*. København: Det Kgl. Nordiske Oldskriftselskab.
- Roesdahl, E. 1979: Eastern Imports at the Viking Fortress of Fyrkat, Denmark. I: B. CHROPOVSKÝ (Hrsg.), *Rapports du 3. Congrès International d'Archéologie Slave Bratislava 7–14 septembre 1975. Tome I (Bratislava)* 665–669.
- Roesdahl, E. 1984: Aggersborgproblemer. I G.Fellows-Jensen & N. Lund: *Beretning fra tredje tværfaglige vikingesymposium*. Aarhus.
- Roesdahl, E. 1986: Vikingernes Aggersborg. I: F. Nørgård, E. Roesdahl, & R. Skovmand (eds.) *Aggersborg gennem 1000 år. Fra Vikingeborg til Slægtsgård*: 53-93. Herning: Poul Kristensens Forlag.
- Roesdahl, E. 1989: *Vikingernes Verden*. København.
- Roesdahl, E. 2004: En gravplads fra tidlig kristen tid – Fyrkat. I: N. Lund (ed.) *Kristendommen i Danmark før 1050*: 153-158. Roskilde: Roskilde Museums Forlag.
- Schmidt, H. 1999, Vikingetidens byggeskik i Danmark (Højbjerg).

Roesdahl, E. & J. Nordquist 1971: De døde fra Fyrkat. *Fra Nationalmuseets Arbejdsmark*, 15-32.

Roslund; Mats 2001: *Gäster I huset: Kulturell överföring mellan slaver og skandinaver 900 till 1300*. Vetenskaps societeten i Lund.

Schmidt, H. 1970: Vikingernes husformede gravsten. *Fra Nationalmuseets Arbejdsmark*, 13-28, Vikingetidens byggeskik i Danmark (Højbjerg).

Schmidt, H. 1981: Trelleborghuset og Fyrkathuset, *Fra Nationalmuseets Arbejdsmark*, 132-143.

Schmidt, H. 1985: Om bygning af et vikingetidshus på Fyrkat. *Fra Nationalmuseets Arbejdsmark*, 48-59.

Schmidt, H. 1990: Viking Age Buildings. *Journal of Danish Archaeology*, vol. 9, 194-202.

Schmidt, H. 1991: Reconstruction of the Lejre Hall. *Journal of Danish Archaeology*, vol. 10, 186-190.

Schmidt, H. 1992: Vikingernes huse. *Fra Nationalmuseets Arbejdsmark*, 122-132.

Schmidt, H. 1999: *Vikingetidens byggeskik i Danmark*. Højbjerg.

Schietzel, K & O. Crumlin-Pedersen 1980: Havnen i Hedeby. *Skalk* 1980, 3:4-10.

Schulz, C.G. 1949: Aggersborg. Vikingeborgen ved Limfjorden. *Fra Nationalmuseets Arbejdsmark*, 91-108.

Segschneider, M. 2002: Alter Ringwall – neu beleuchtet. Die geophysikalische Prospektion des Burgwalles bei Borgsum auf Föhr, Nordfriesland. *Beretning fra enogtyvende tværfaglige vikingesymposium*. Aarhus.

Stilling, N.P. 1981: Trelleborg-hypoteser. Om de danske vikingeborges funktion og historiske betydning, *Scania* 47:29-144.

Stoumann, I 1980: Sædding. A Viking-age Village near Esbjerg. *Acta Archaeologica*, 50, 1979:95-118.

Stylegar, F.- A. 2005: En trelleborg i Rygge. *Arkeologi i nord*.
<http://arkeologi.blogspot.com/2005/03/en-trelleborg-i-rygge.html>

Svanberg, F. 1998: Exclusive jewellery, Borgeby and western Scania c. AD 950-1050. *Fornvännen* 93, 1998:113-124.

Svanberg, F. & B. Söderberg 2000: *Den vikingatida borgen i Borgeby. Arkeologiska studier kring Borgeby och Löddeköpinge 1*. Malmö: Copy Quick.

Tornbjerg, S.Å., 1998: Toftegård - en fundrig gård fra sen jernalder og vikingetid. In L. Larsson & B. Hårdh (red.) *Centrale Platser - Centrale Frågor. Samhållsstrukturen under Jårnåldern*. En vånbok till Berta Stjernquist. I *Acta Archaeologica Lundensia*, No. 28, 217-232. Stockholm

Thrane, H. 1991: Nonnebakken. Odenses forsvundne vikingeborg. *Fyns Stiftsmuseums arkæologiske vejvisere 2* (Odense).

Trimpe-Burger, J.A. 1975: The geometrical fortress of Oost-Souburg (Zeeland). *Chateau Gaillard* VII. Caen 1975:215-219.

Ulriksen, J. 1995: Aggersborgs forsvarsværker. *Aarbøger for Nordisk Oldkyndighed og Historie* 1993:181-203.

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